

Figure B-5. Chambersburg-Waynesboro, PA MSA

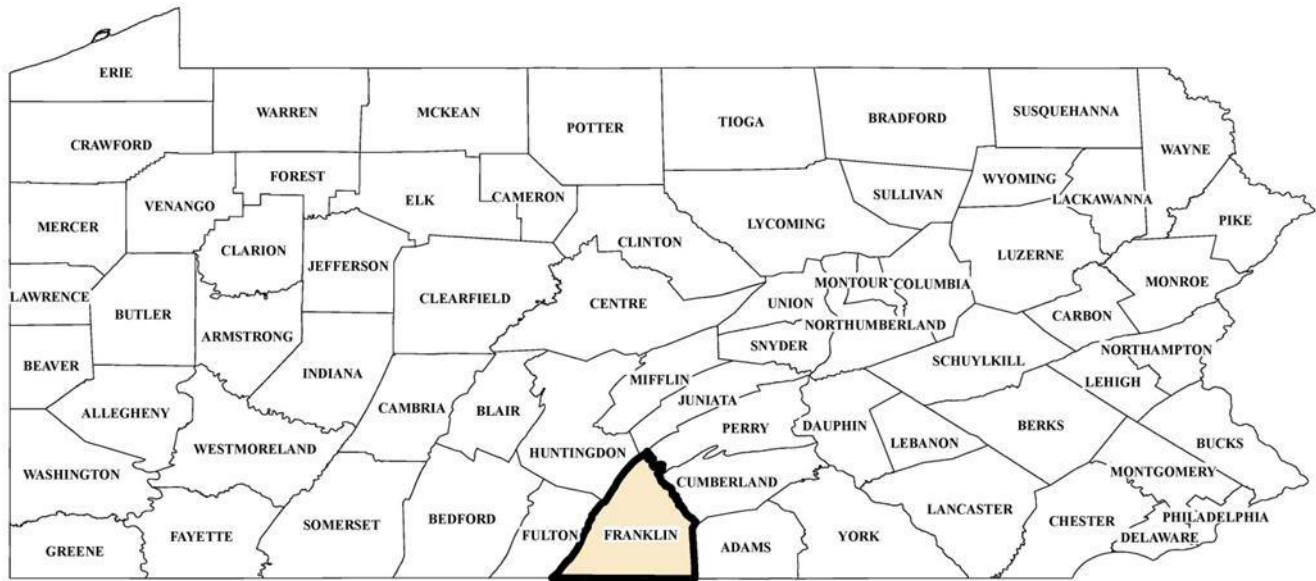


Figure B-6. Chambersburg-Waynesboro, PA MSA Site Detail

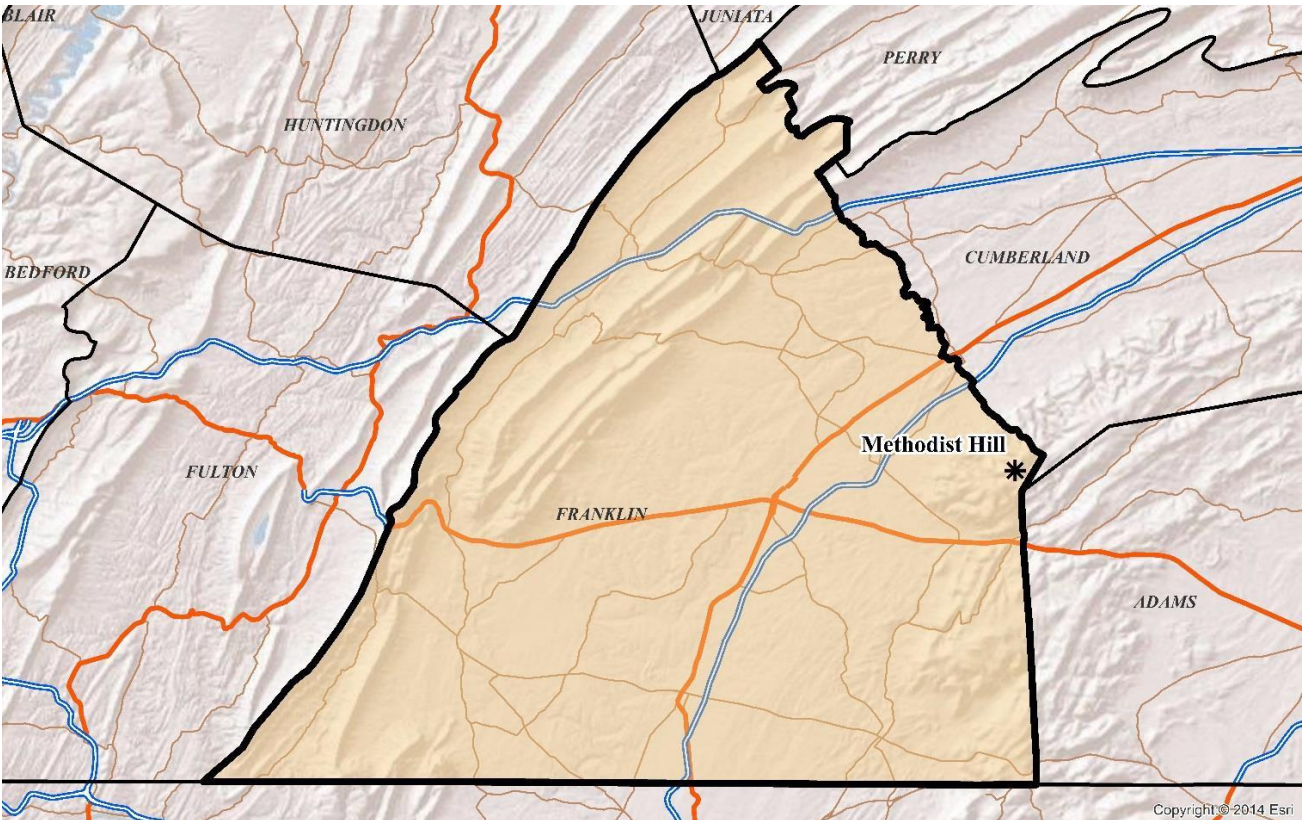


Figure B-7. East Stroudsburg, PA MSA

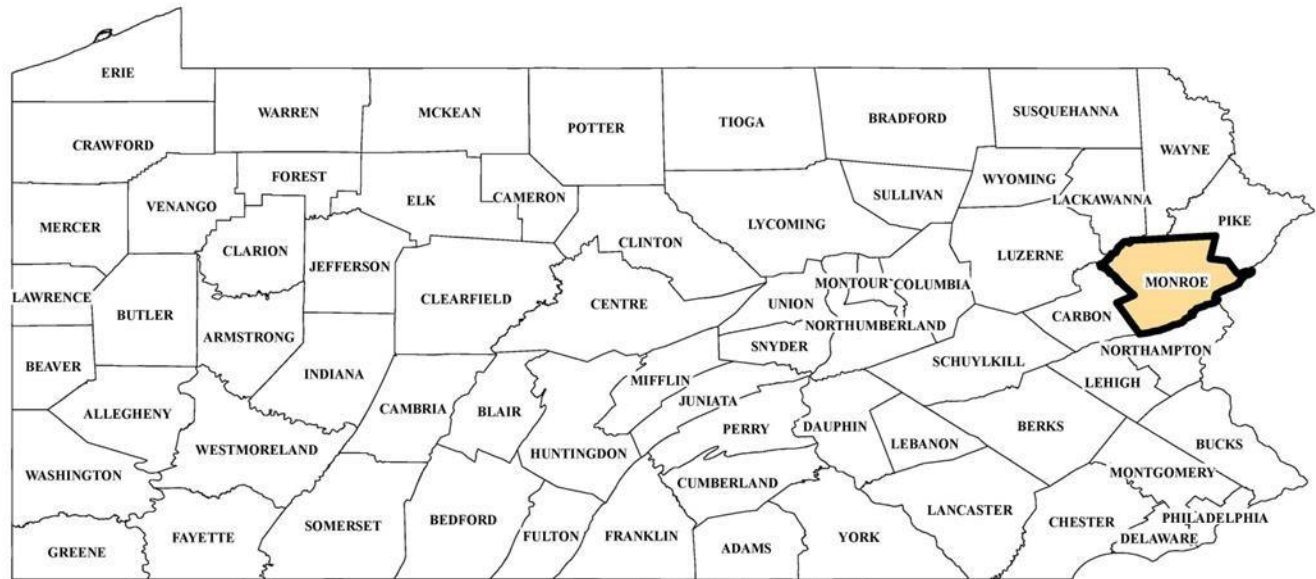


Figure B-8. East Stroudsburg, PA MSA Site Detail

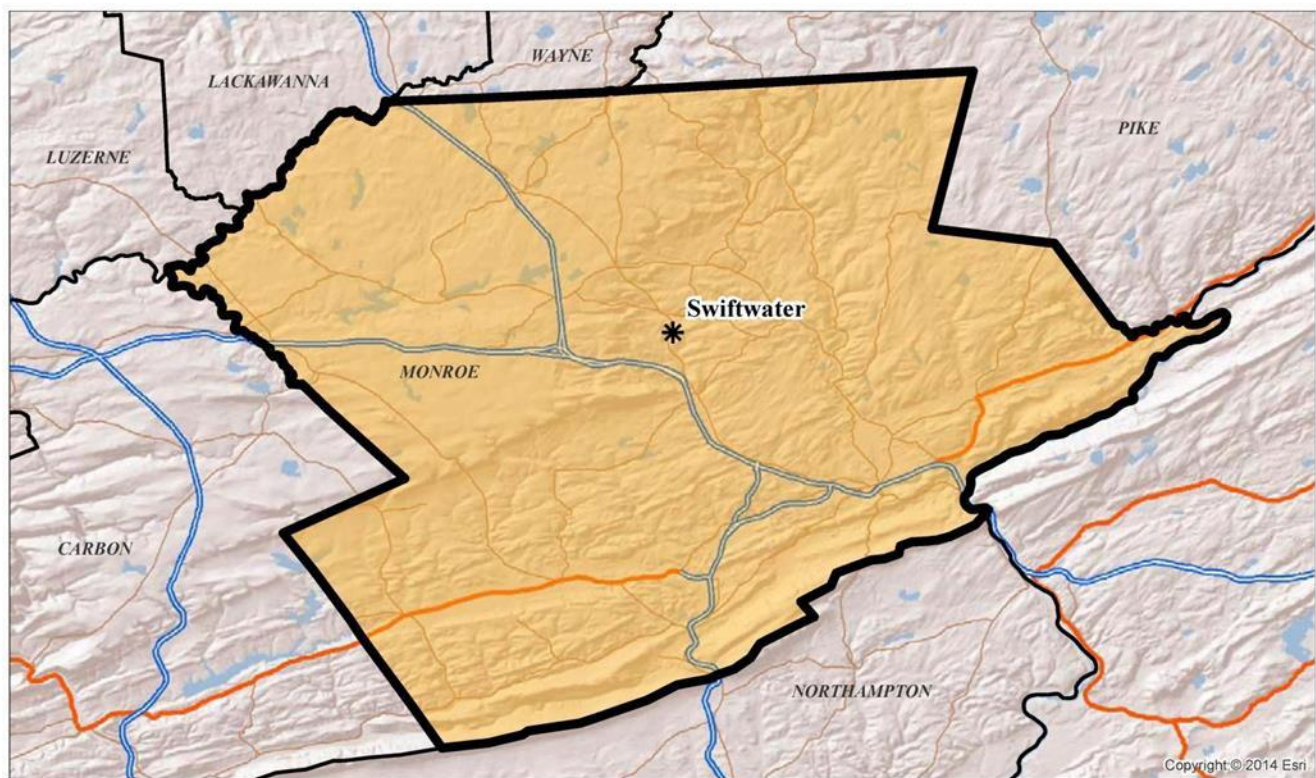


Figure B-9. Erie, PA MSA

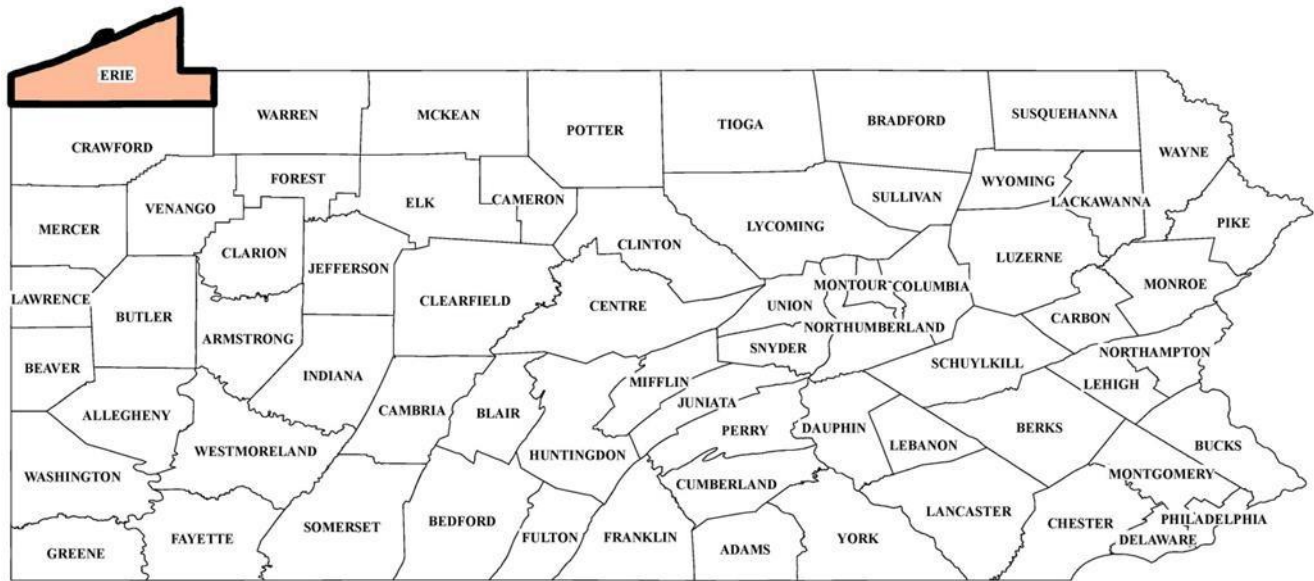


Figure B-10. Erie, PA MSA Site Detail

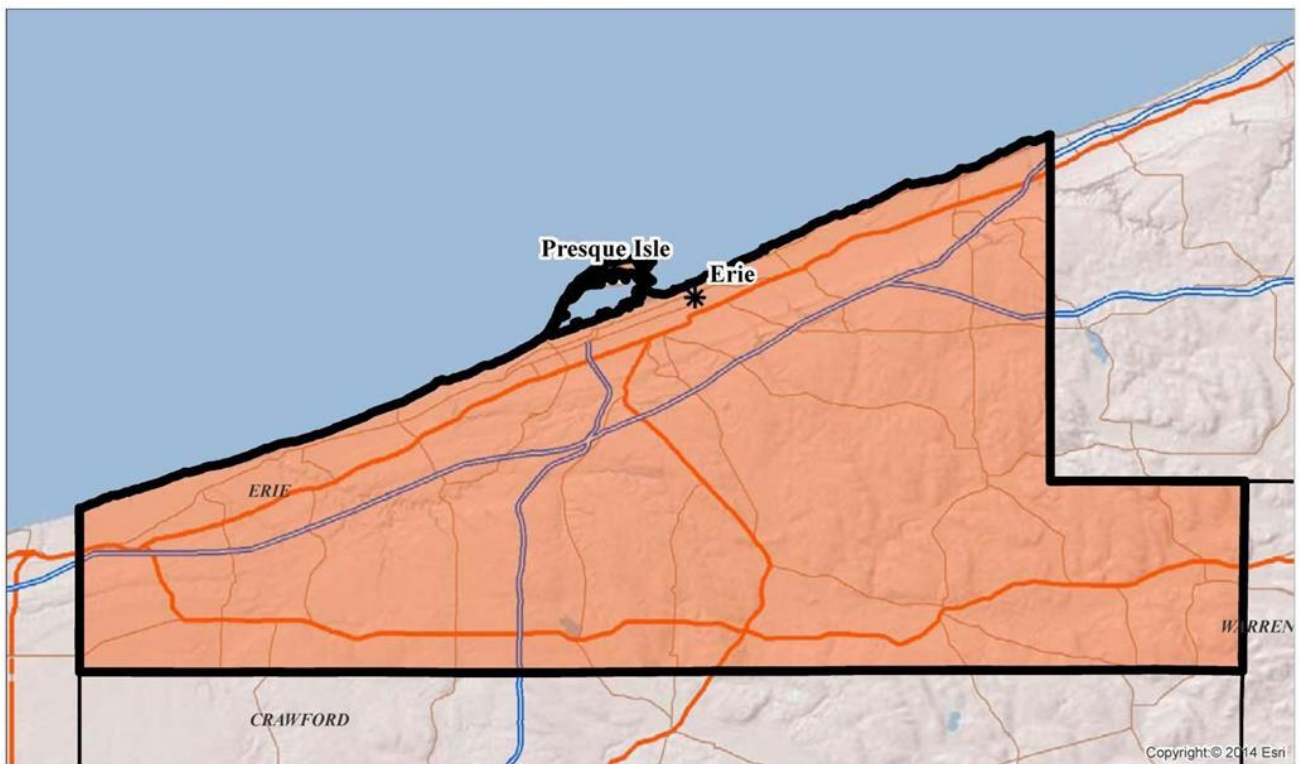


Figure B-11. Gettysburg, PA MSA

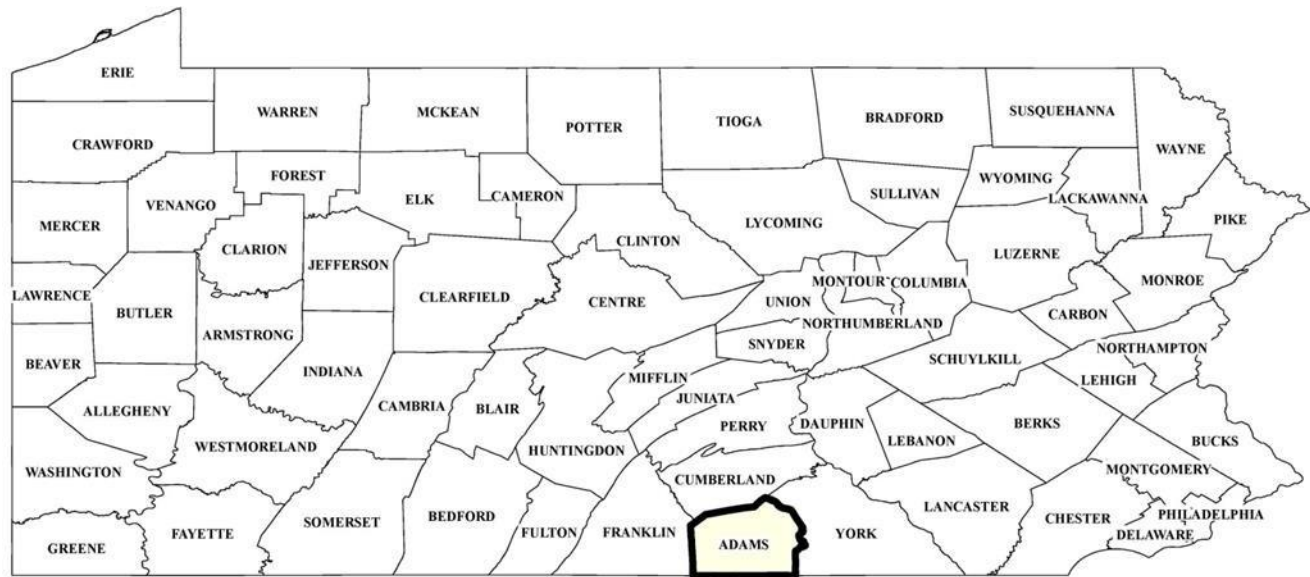


Figure B-12. Gettysburg, PA MSA Site Detail

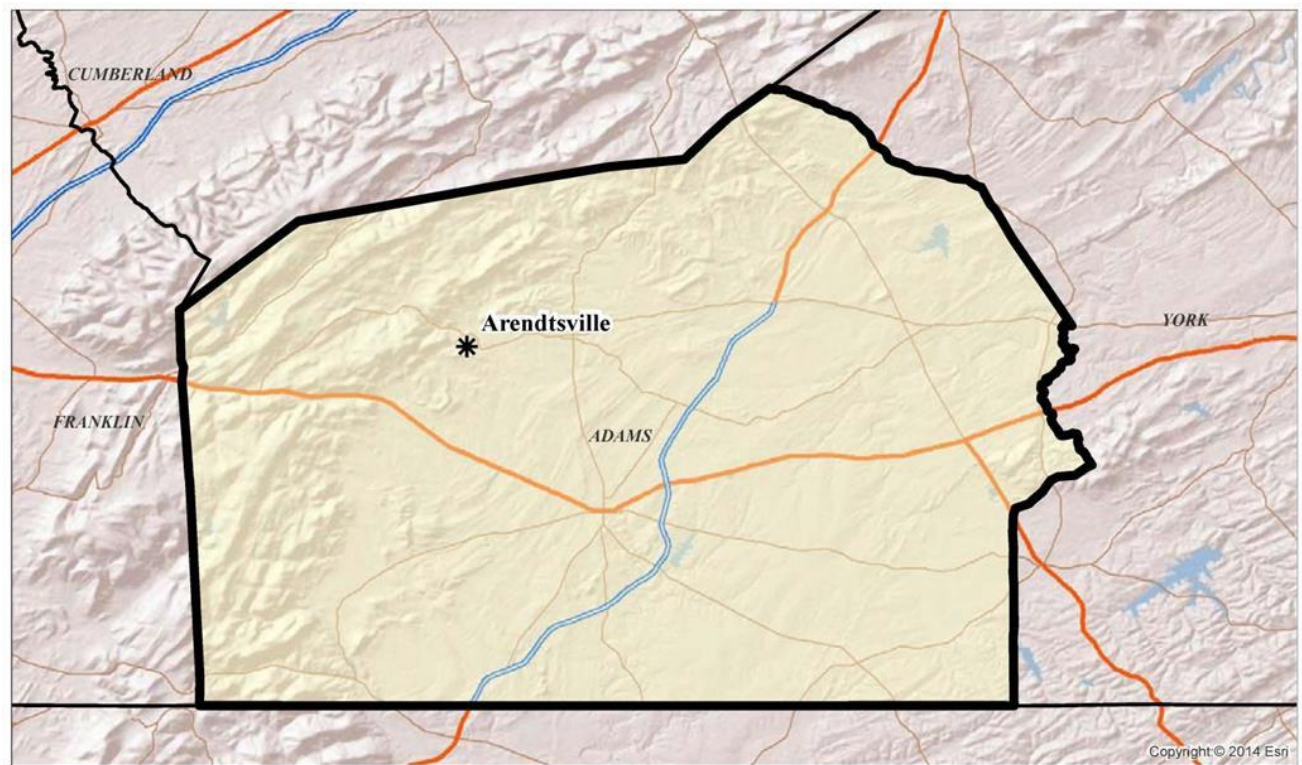


Figure B-13. Harrisburg-Carlisle, PA MSA

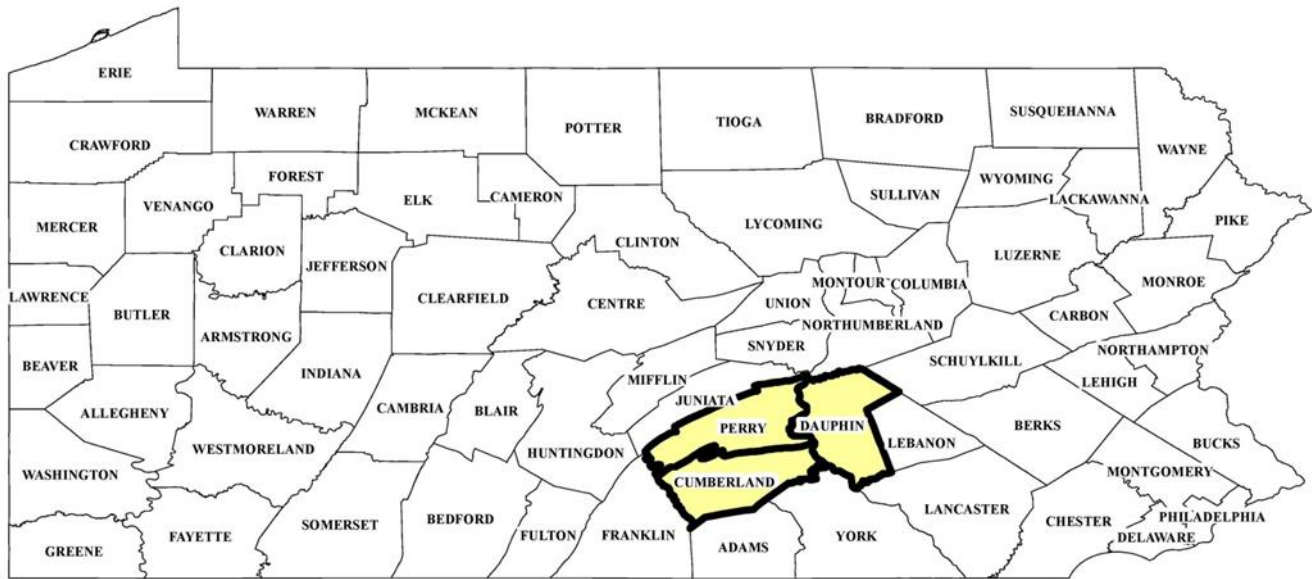


Figure B-14. Harrisburg-Carlisle, PA MSA Site Detail

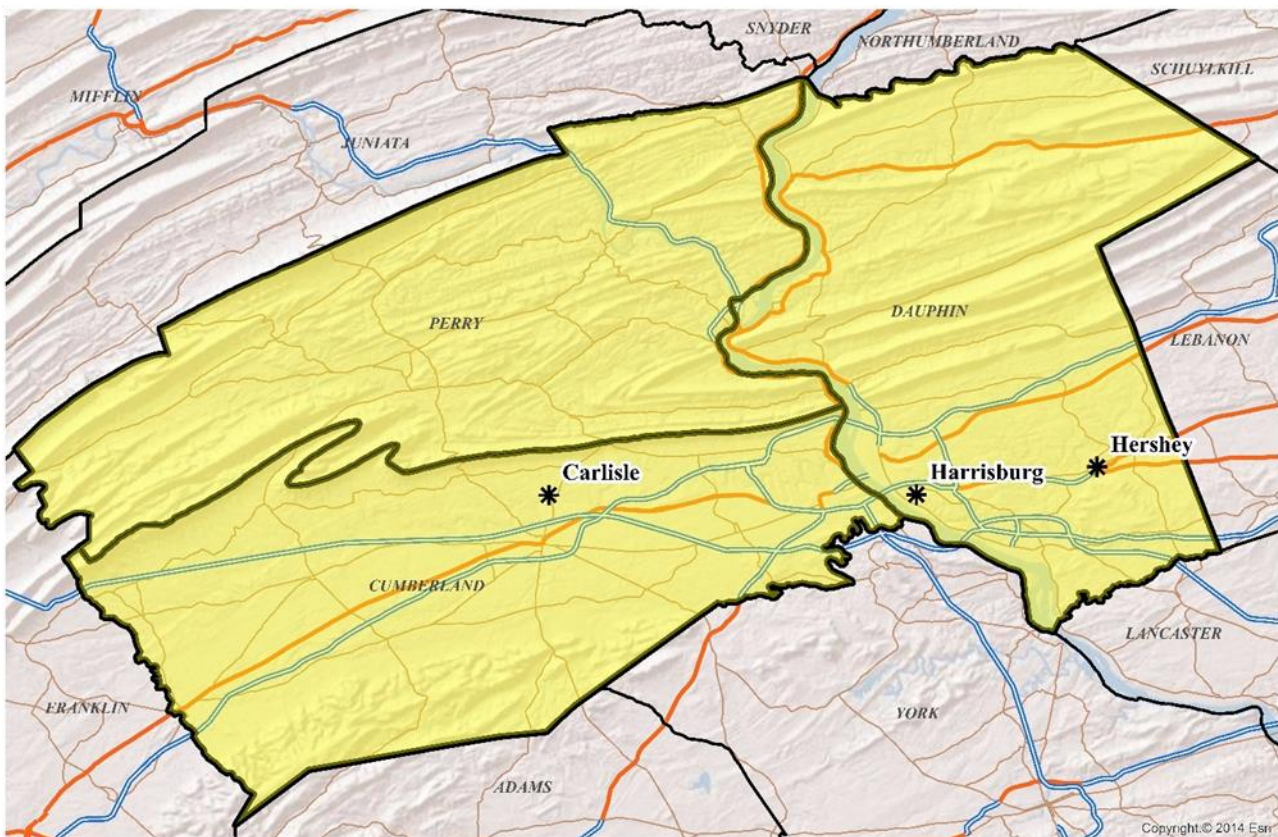


Figure B-15. Johnstown, PA MSA

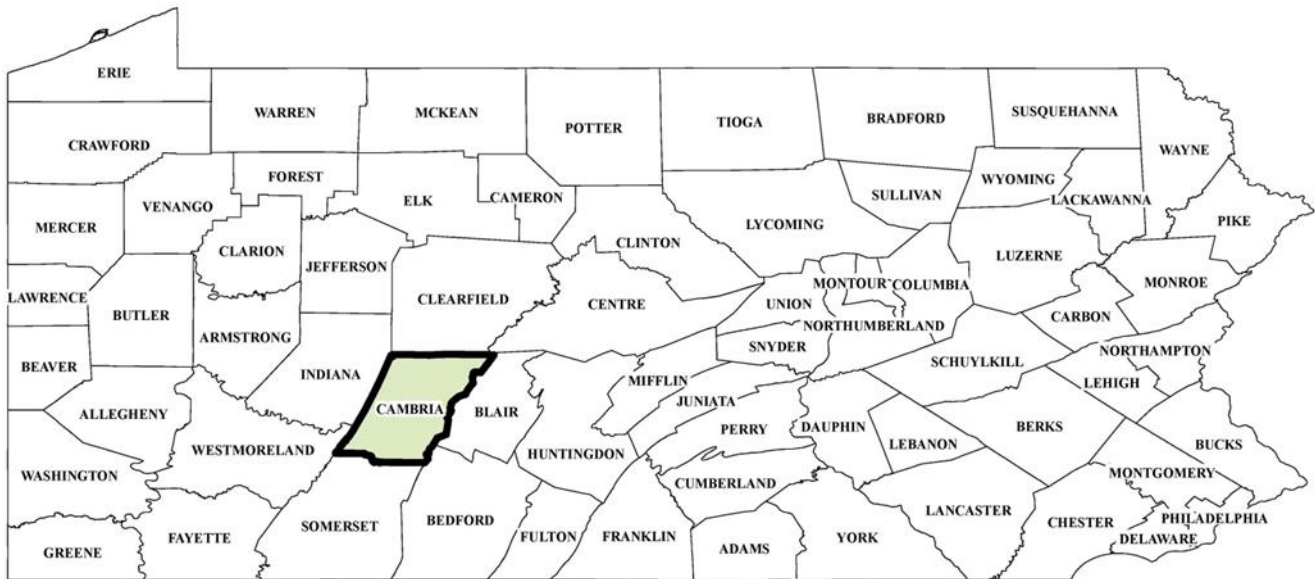


Figure B-16. Johnstown, PA MSA Site Detail

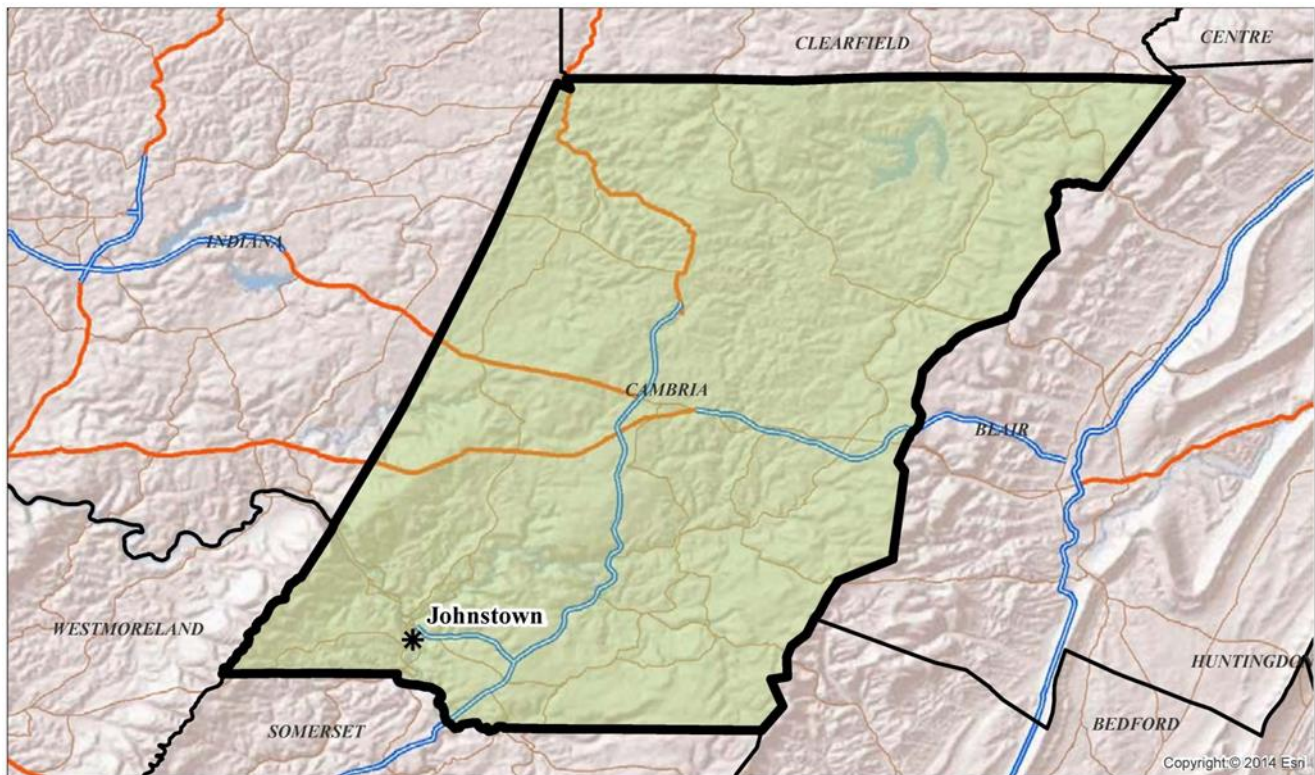


Figure B-17. Lancaster, PA MSA

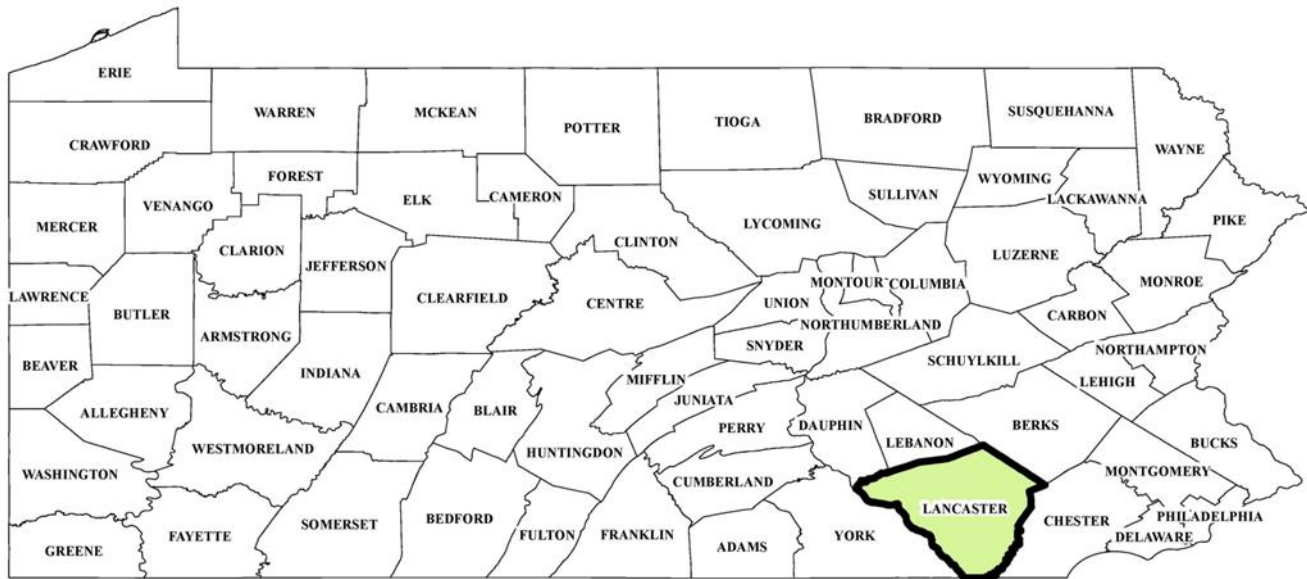


Figure B-18. Lancaster, PA MSA Site Detail

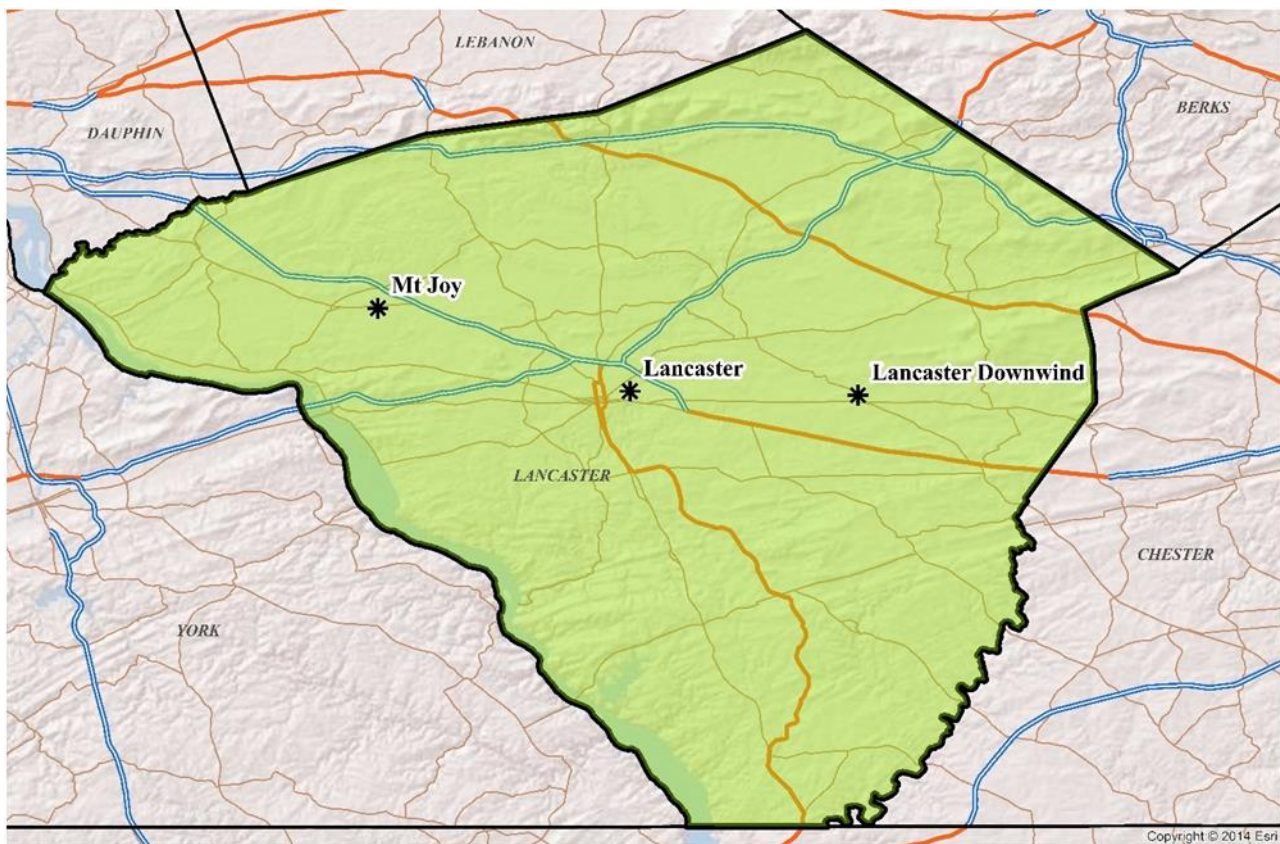


Figure B-19. Lebanon, PA MSA

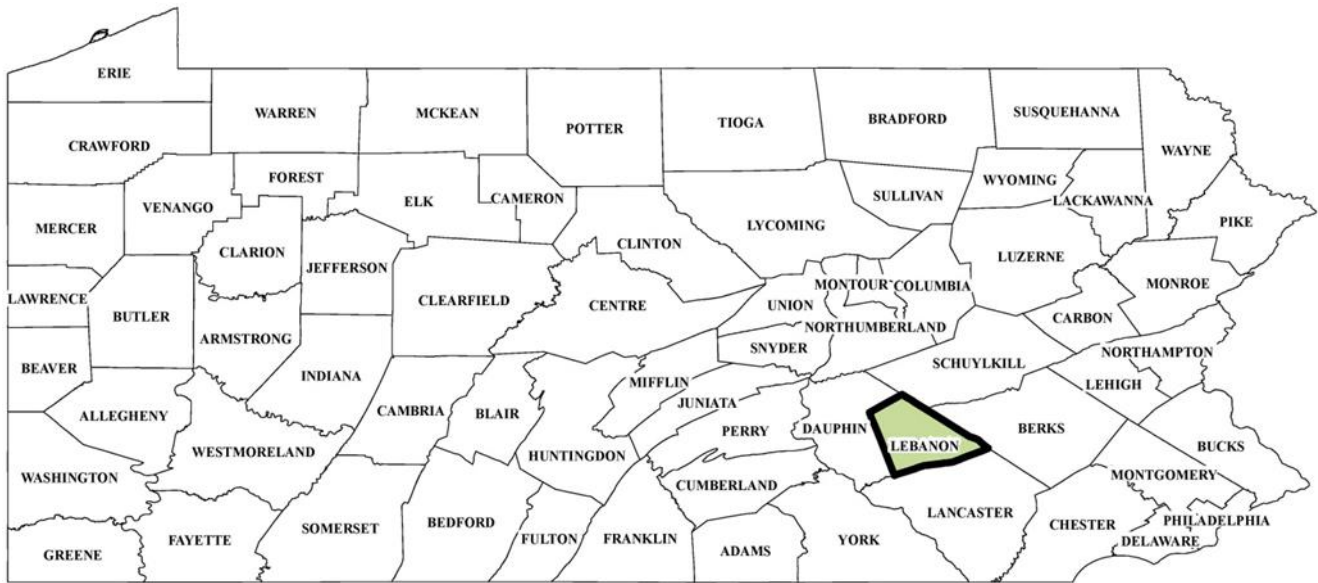


Figure B-20. Lebanon, PA MSA Site Detail

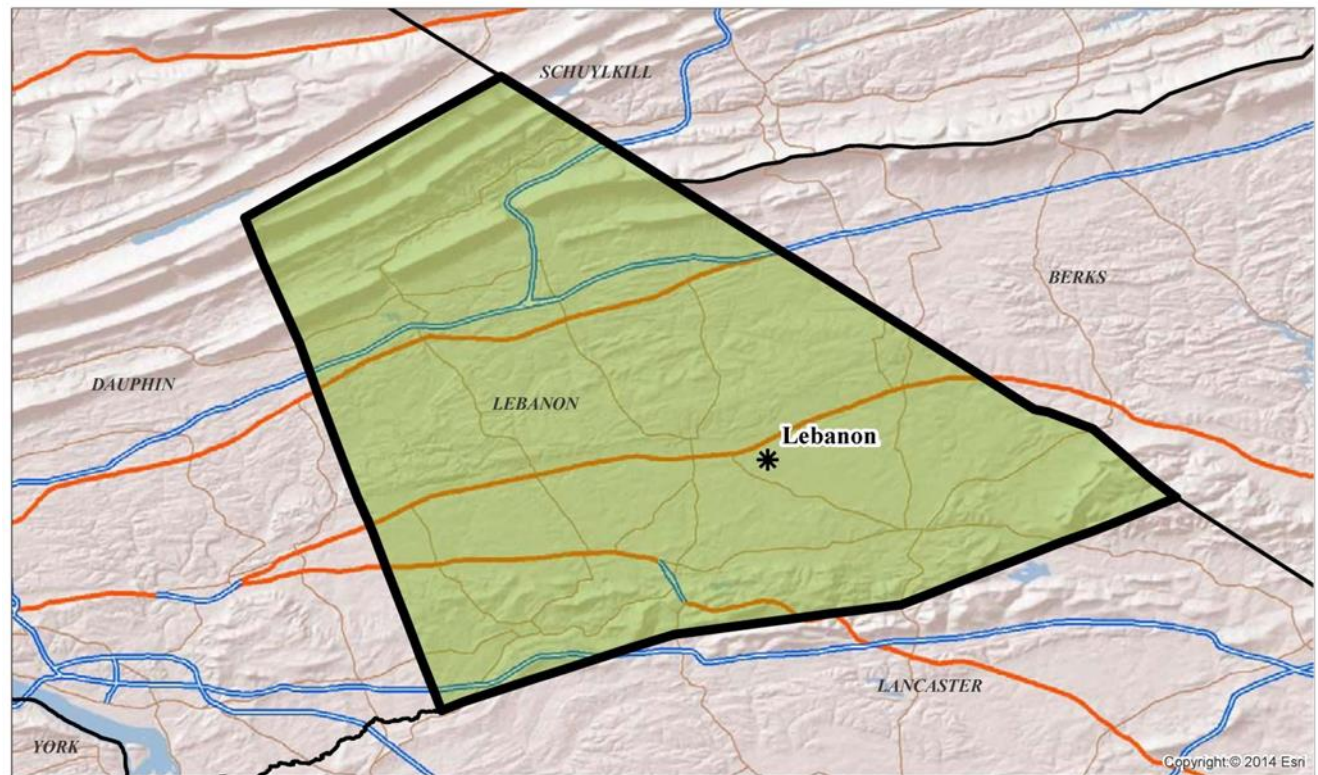


Figure B-21. Philadelphia-Camden-Wilmington, PA-NJ-DE-MD MSA (Pennsylvania portion)

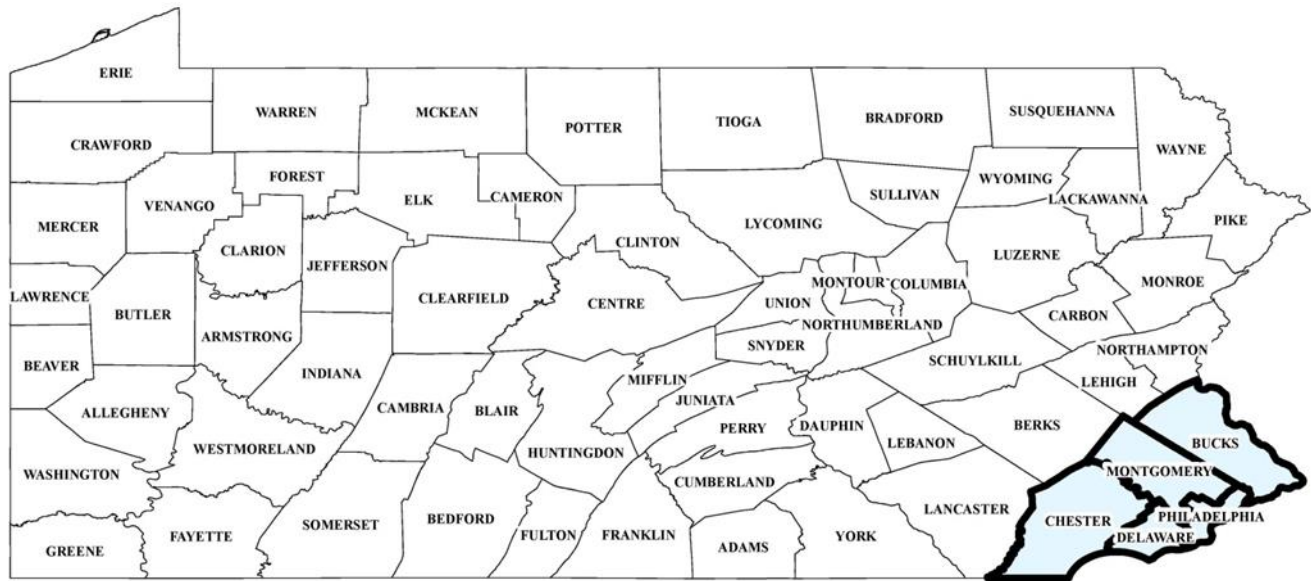


Figure B-22. Philadelphia-Camden-Wilmington, PA-NJ-DE-MD MSA (Pennsylvania portion) Site Detail

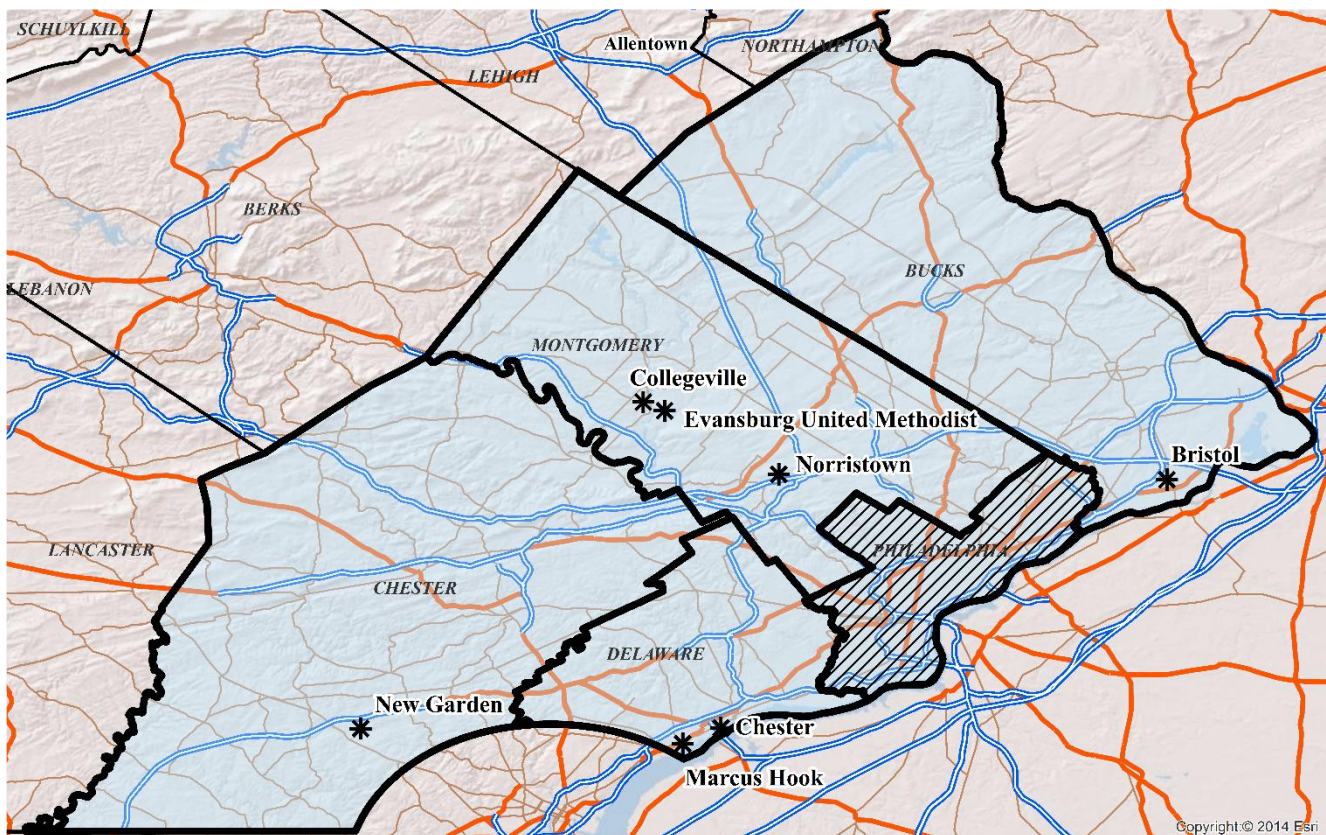


Figure B-23. Pittsburgh, PA MSA

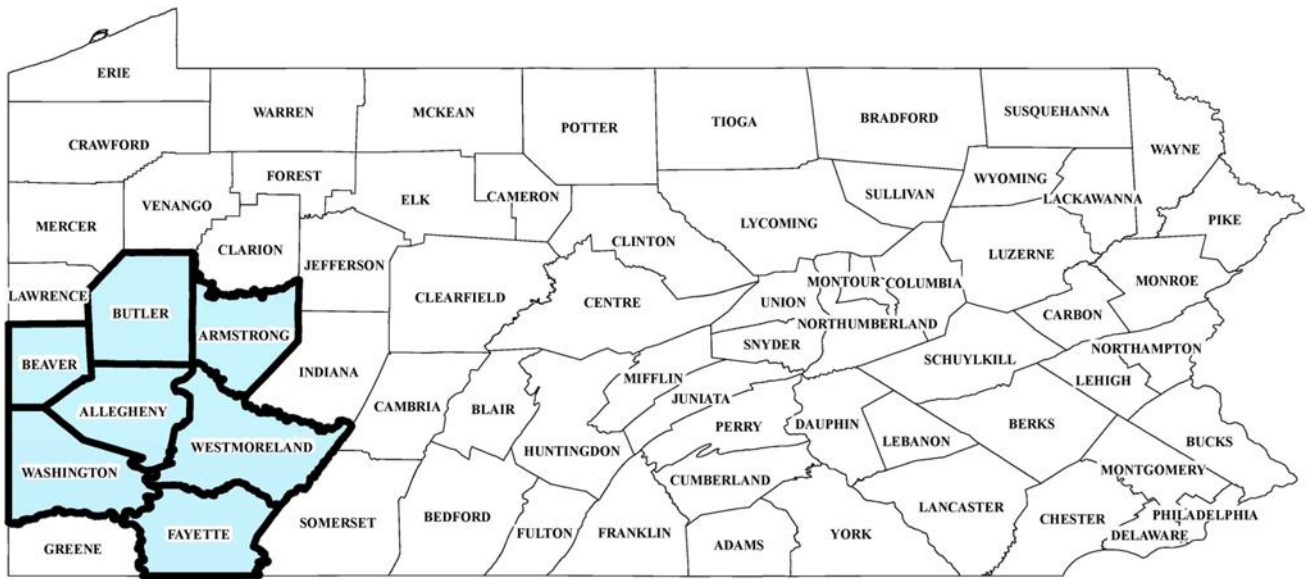


Figure B-24. Pittsburgh, PA MSA Site Detail

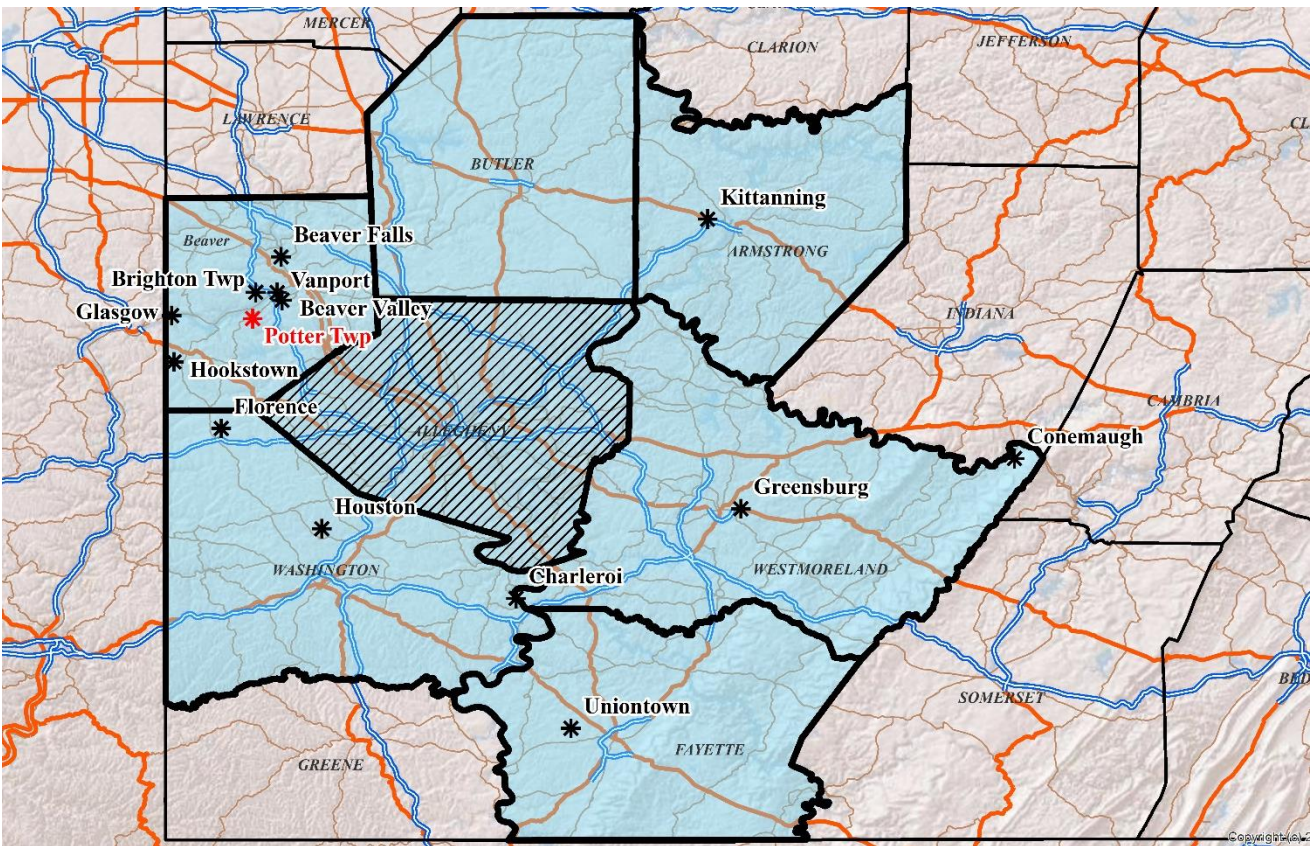


Figure B-25. Reading, PA MSA Overview

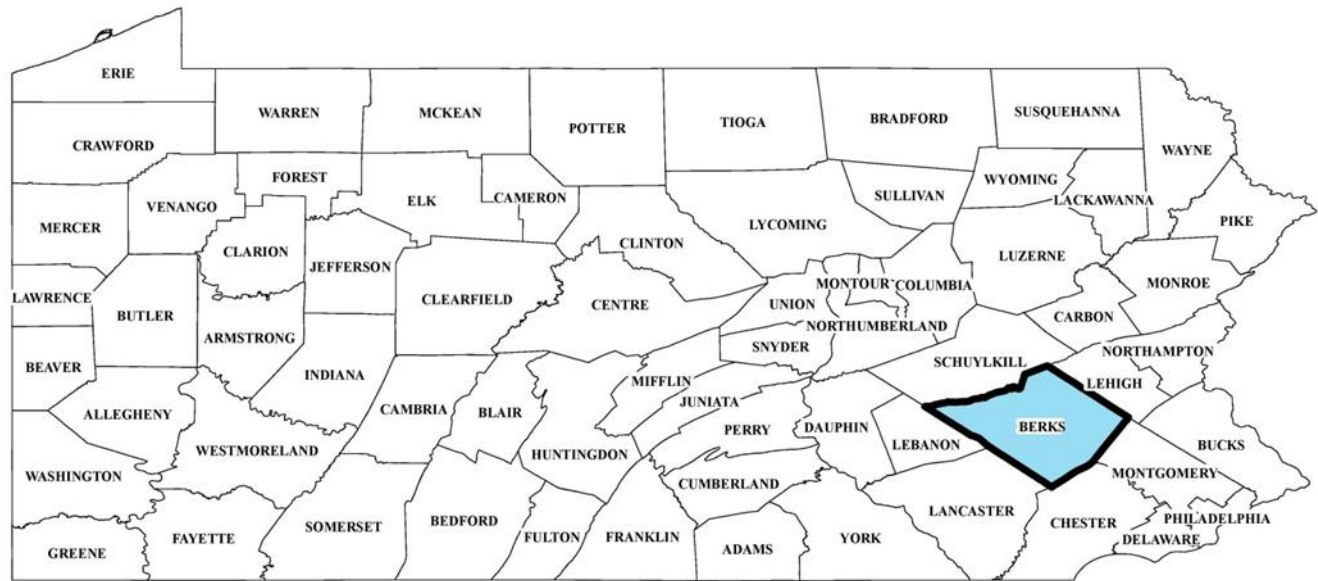


Figure B-26. Reading, PA MSA Site Detail

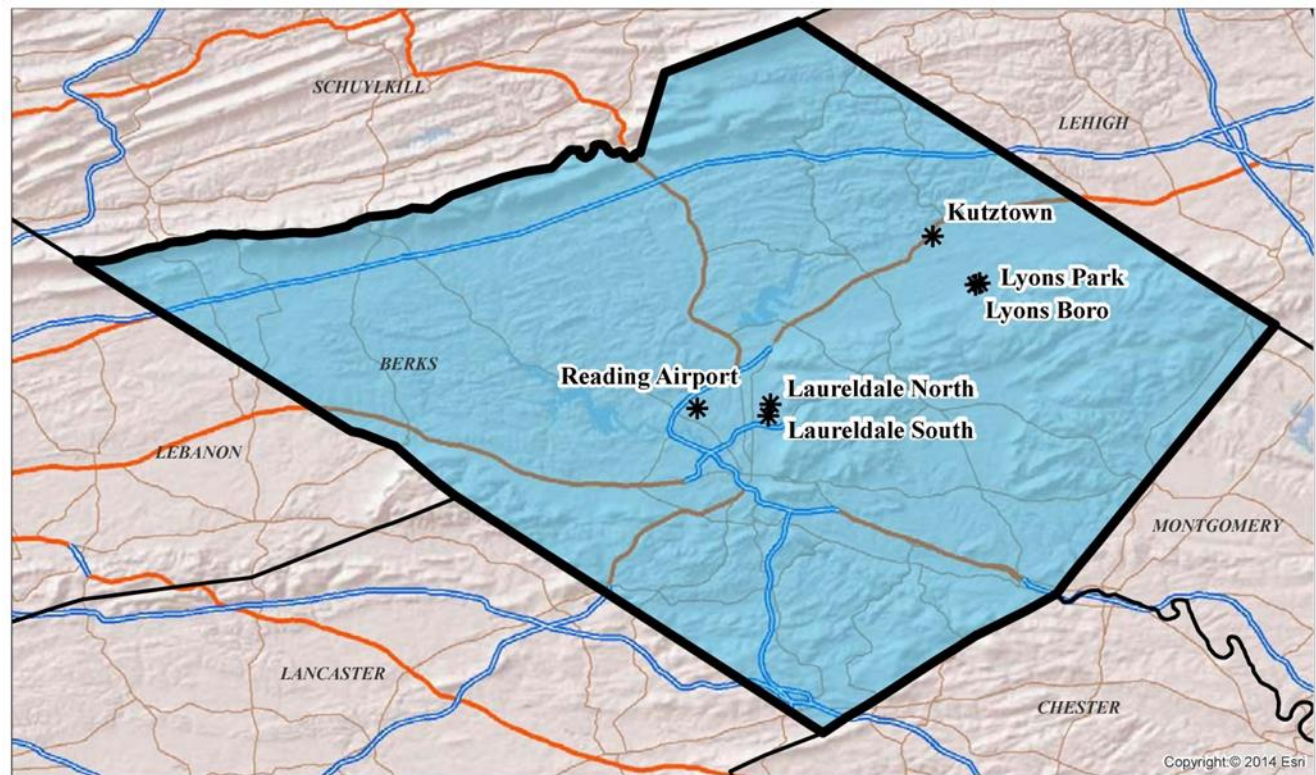


Figure B-27. Scranton-Wilkes-Barre-Hazleton, PA MSA

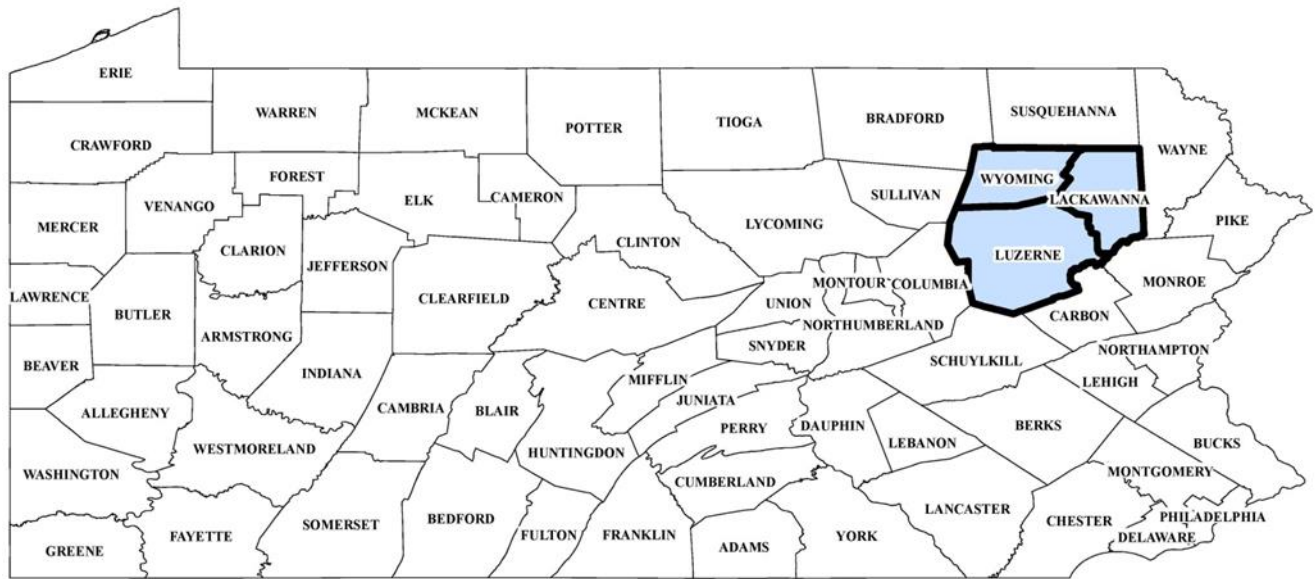


Figure B-28. Scranton-Wilkes-Barre-Hazleton, PA MSA Site Detail

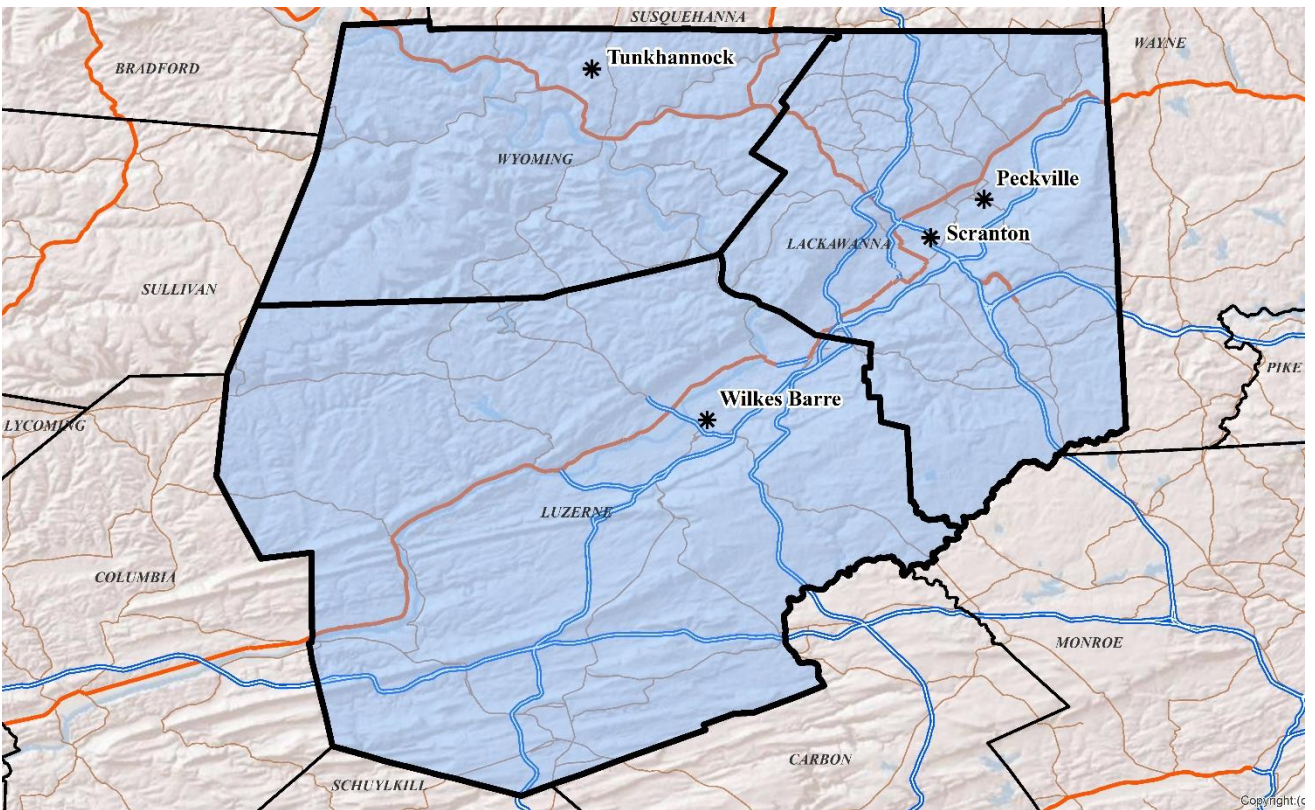


Figure B-29. State College, PA MSA

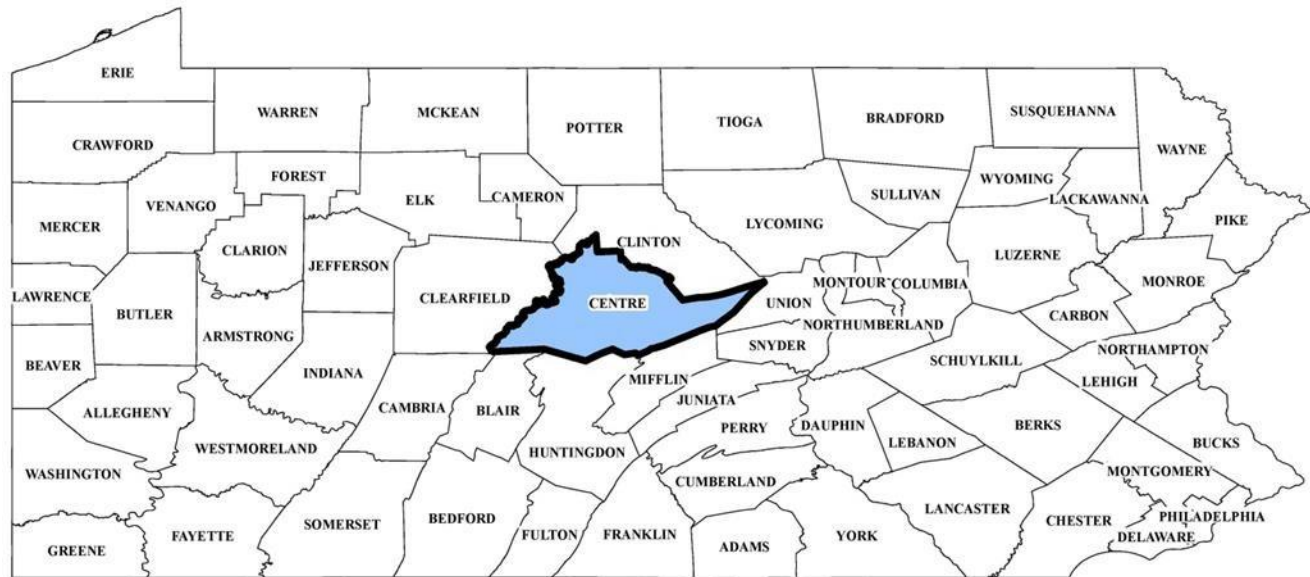


Figure B-30. State College, PA MSA Site Detail

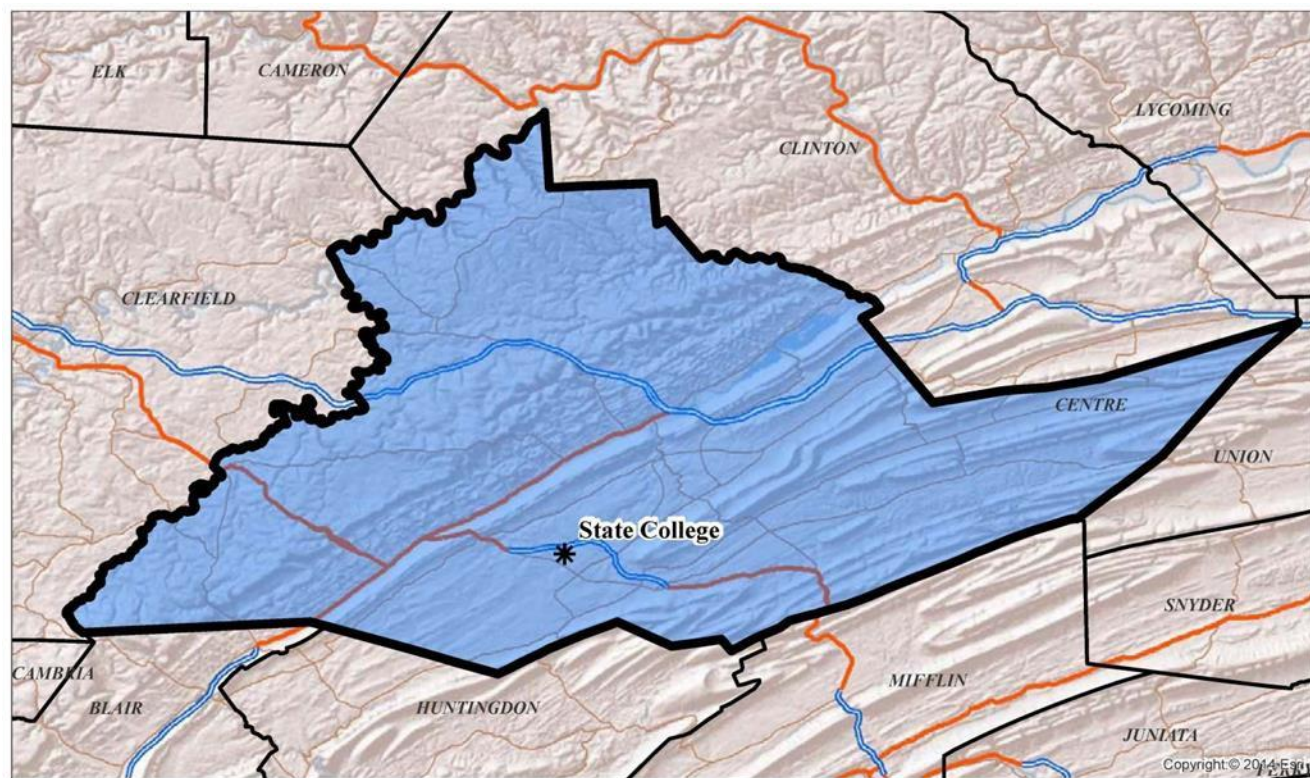


Figure B-31. Williamsport, PA MSA

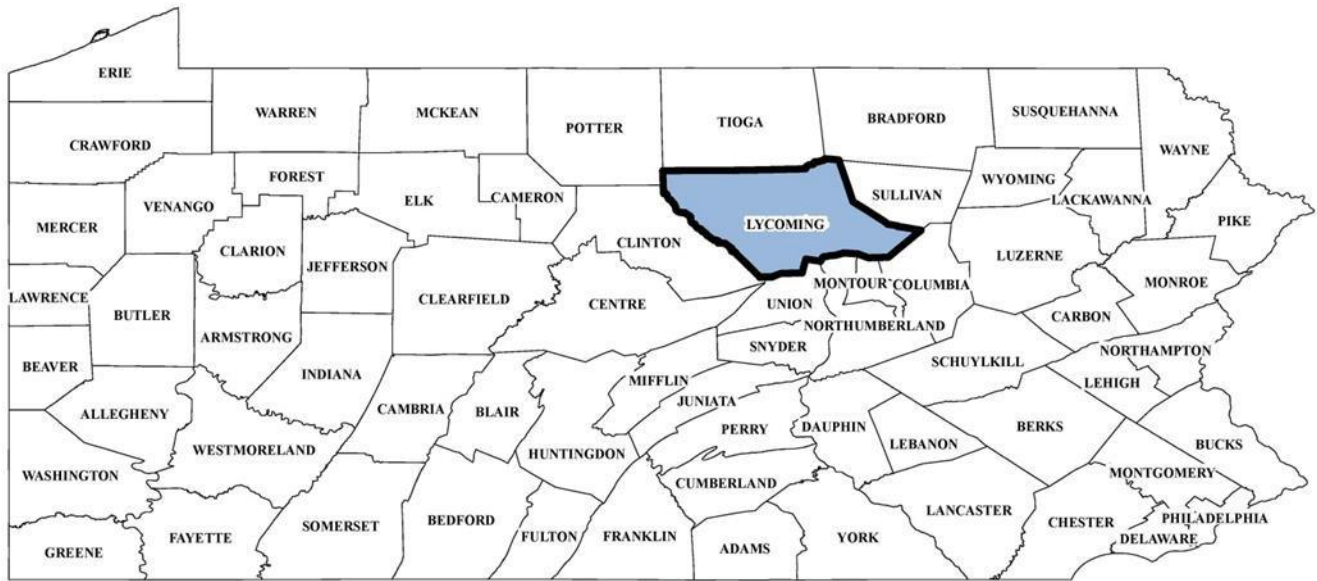


Figure B-32. Williamsport, PA MSA Site Detail

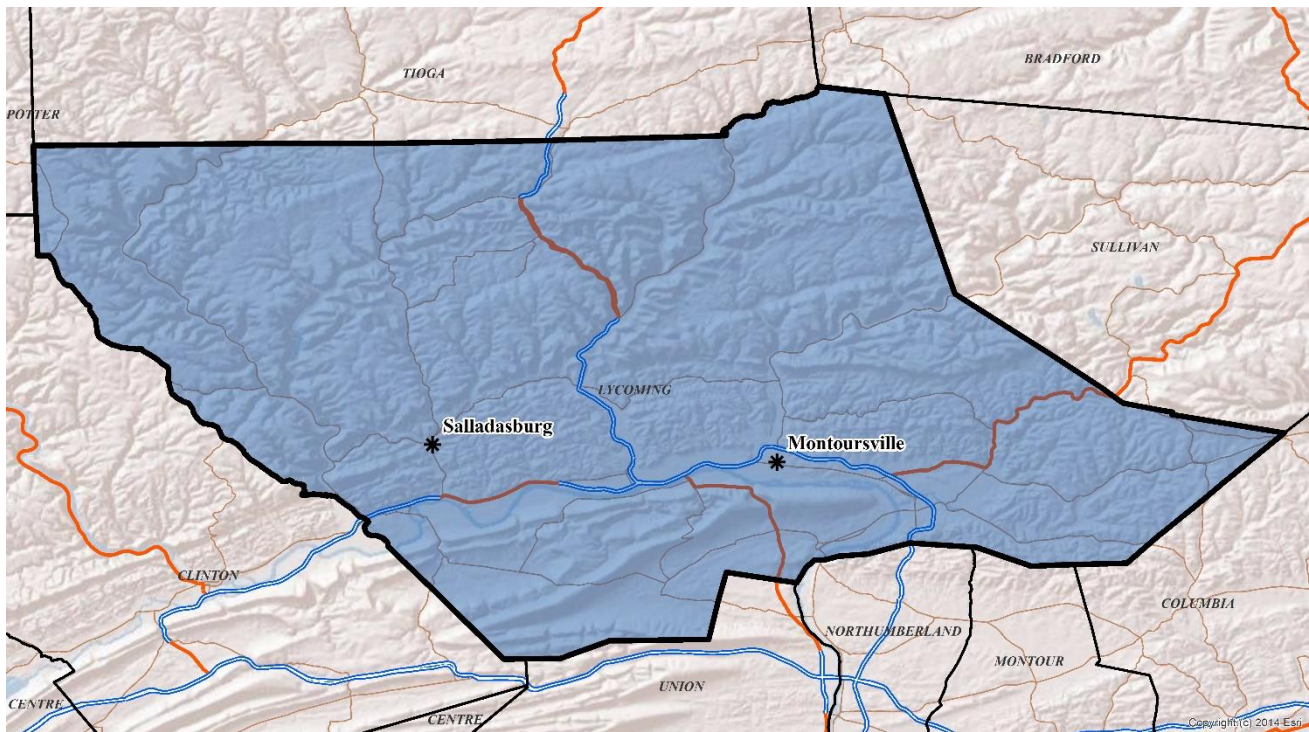


Figure B-33. York-Hanover, PA MSA

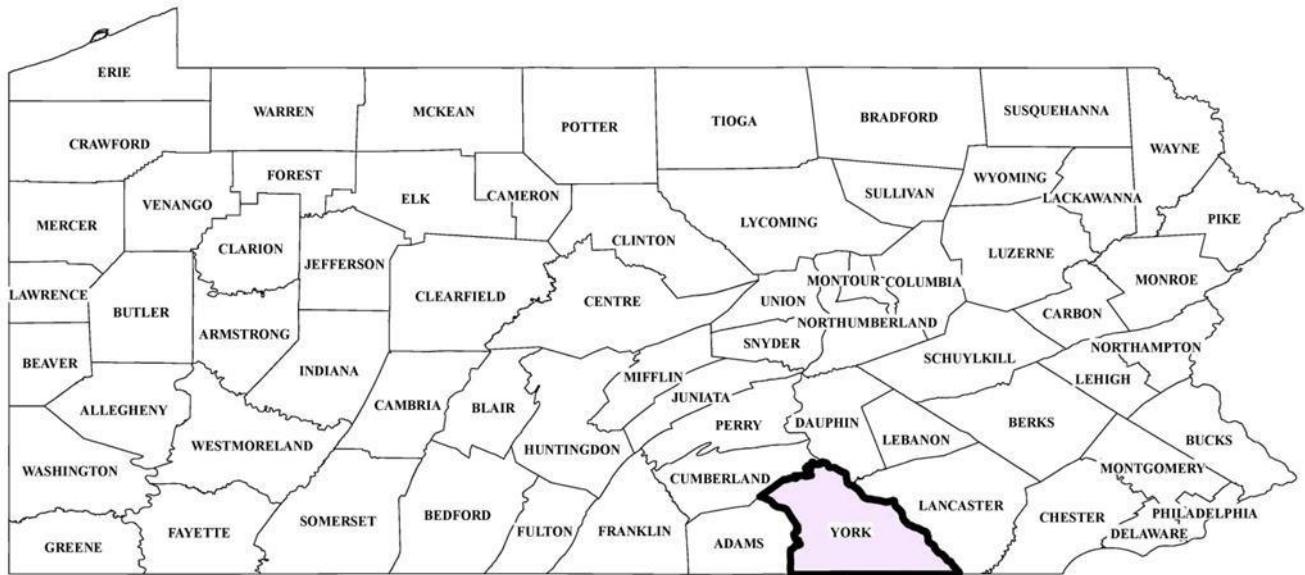


Figure B-34. York-Hanover, PA MSA Site Detail

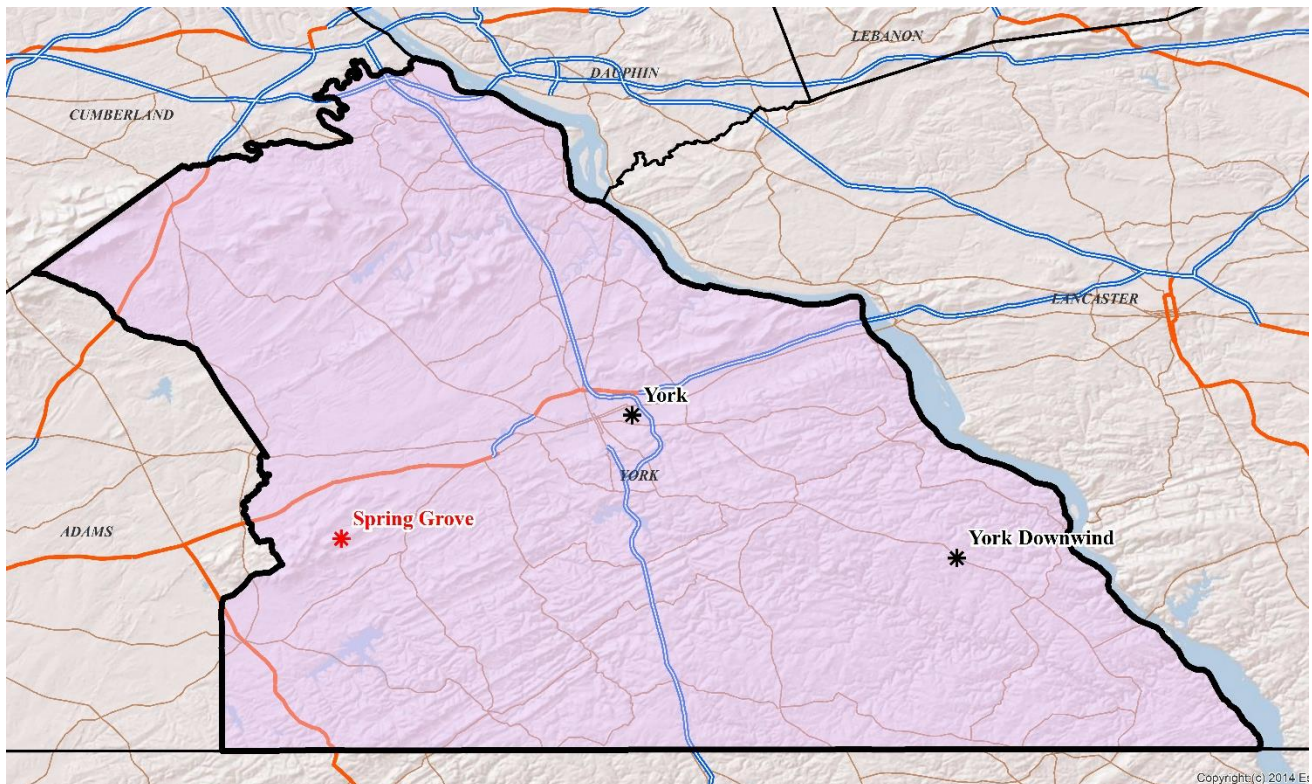


Figure B-35. Youngstown-Warren-Boardman, OH-PA MSA (Pennsylvania portion)

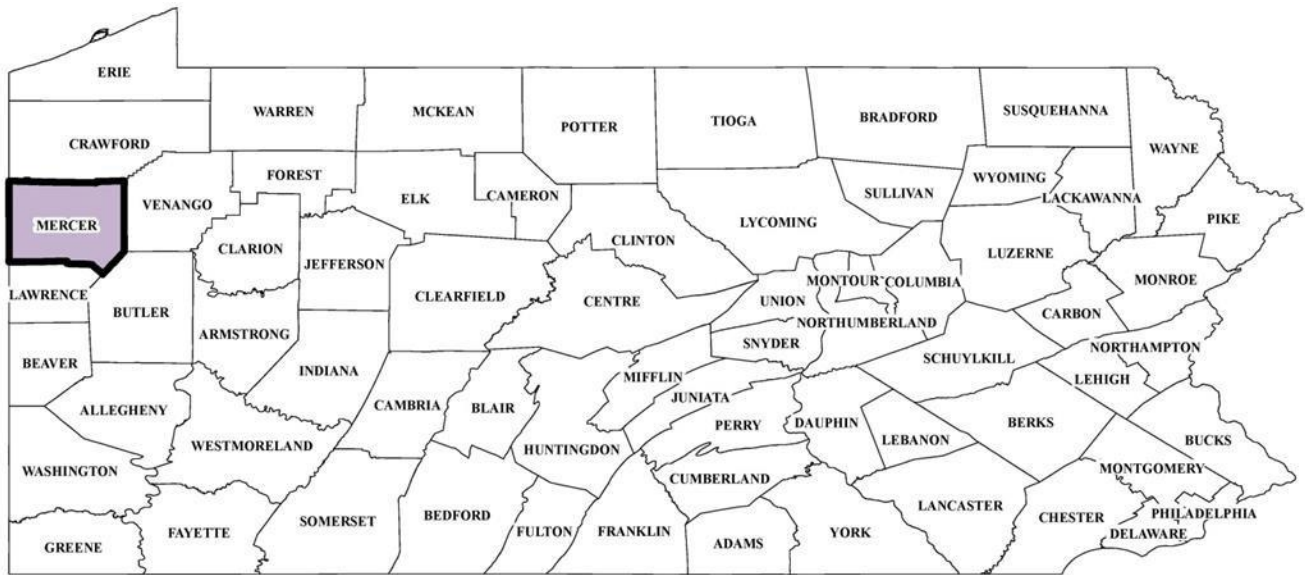


Figure B-36. Youngstown-Warren-Boardman, OH-PA MSA (Pennsylvania portion) Site Detail

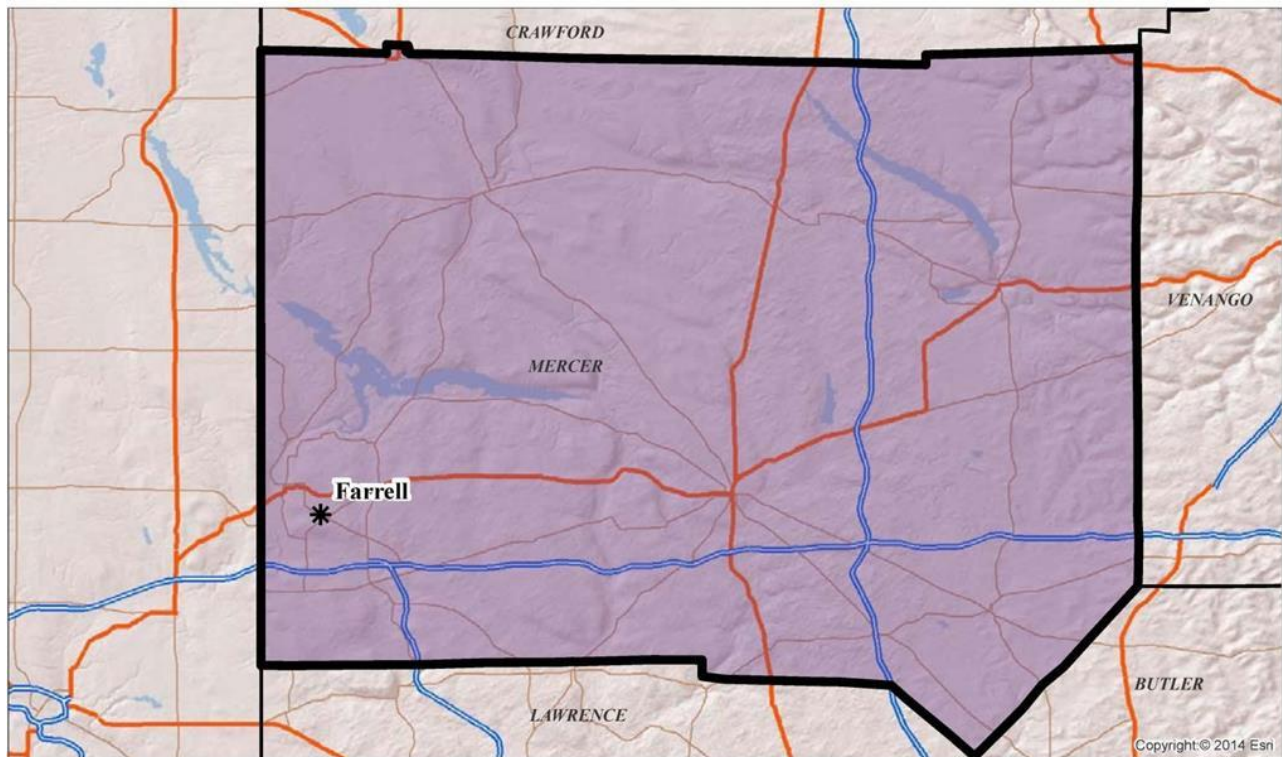


Figure B-37. Overview of the DuBois, PA Micro Area

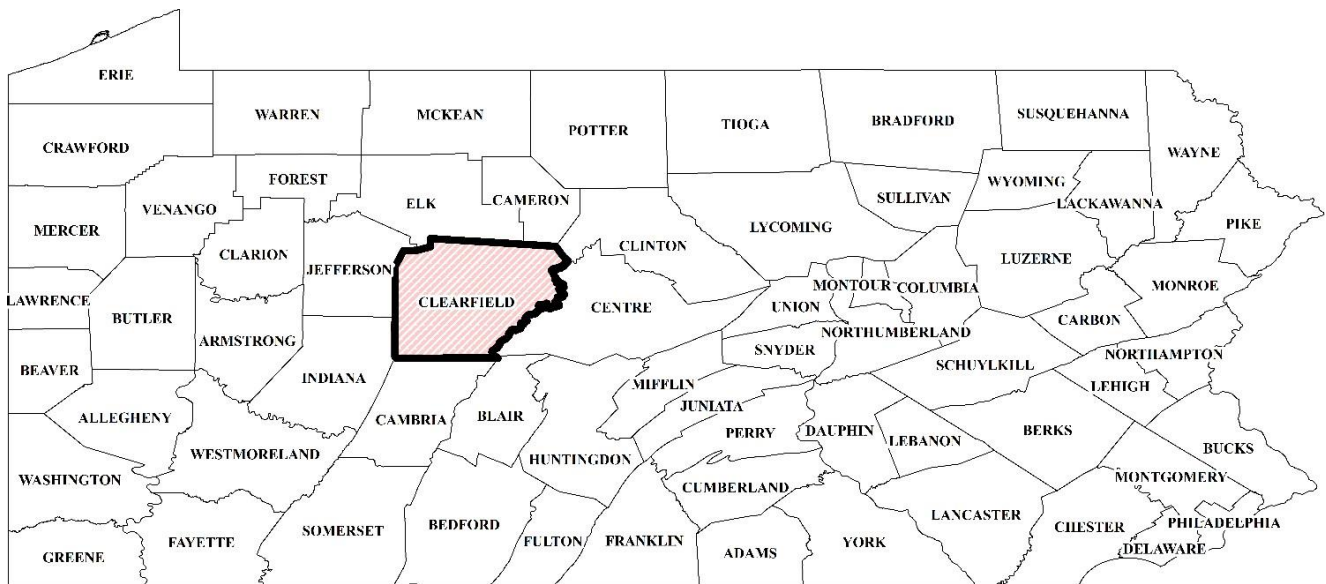


Figure B-38. DuBois, PA Micro Area Site Detail

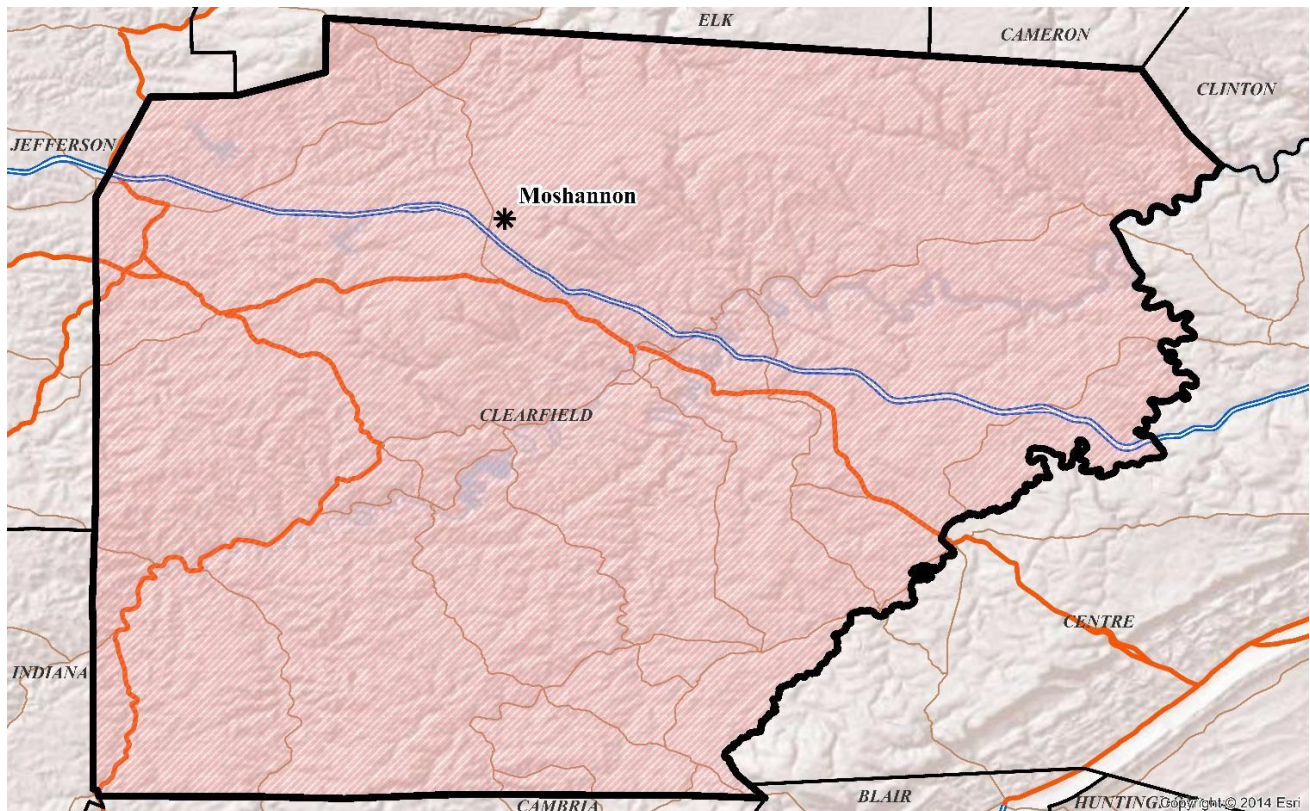


Figure B-39. Overview of the Indiana, PA Micro Area

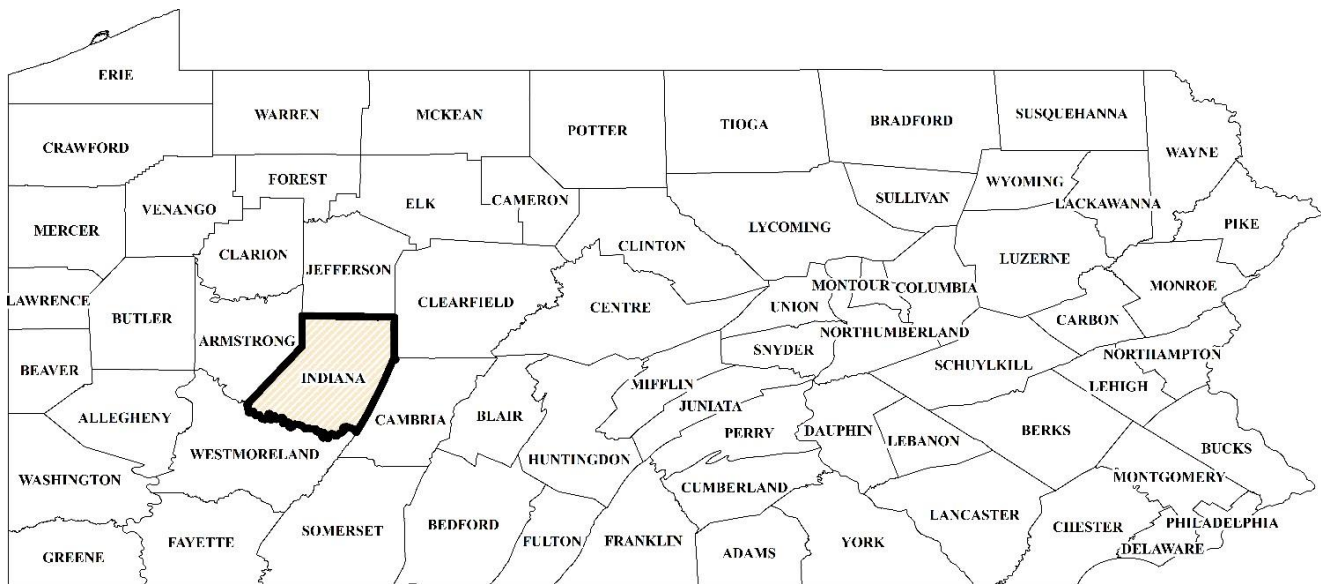


Figure B-40. Indiana, PA Micro Area Site Detail

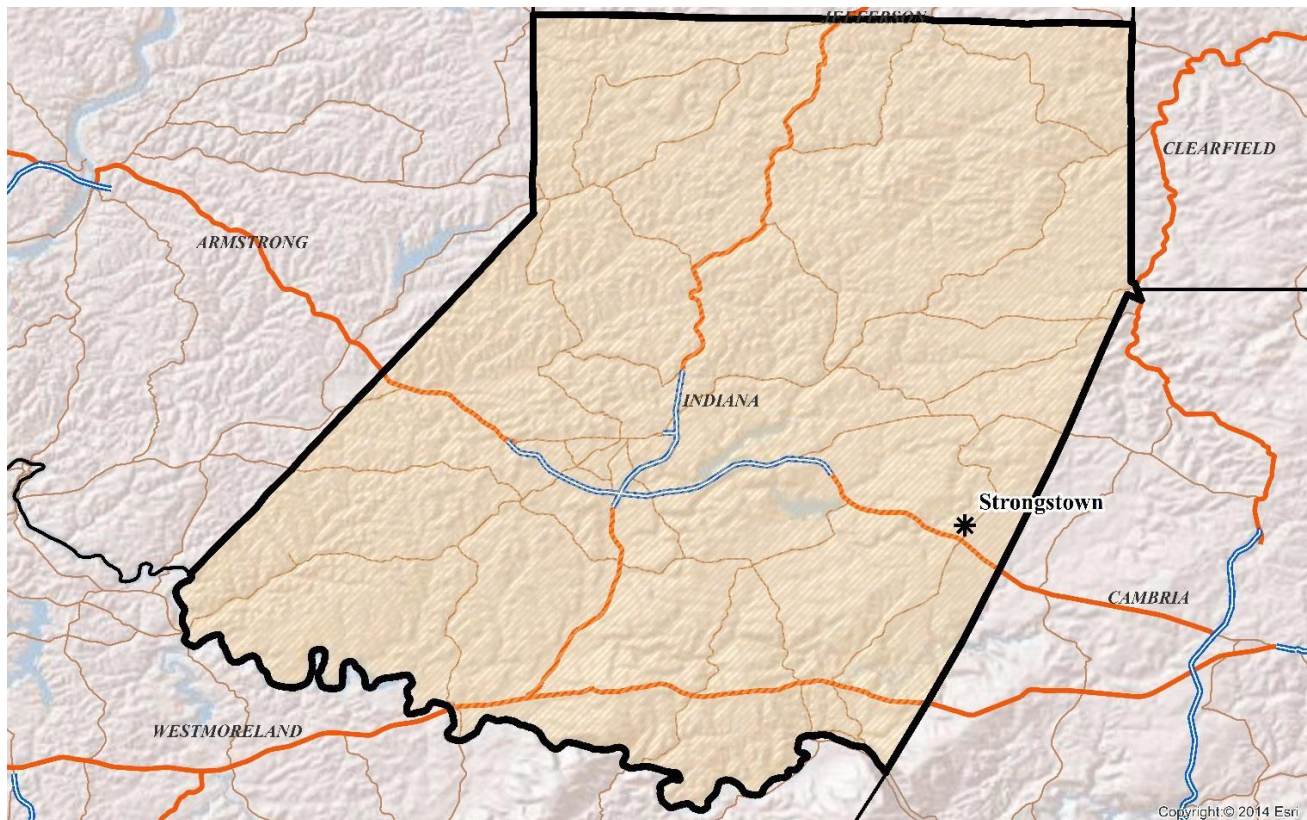


Figure B-41. Overview of the New Castle, PA Micro Area

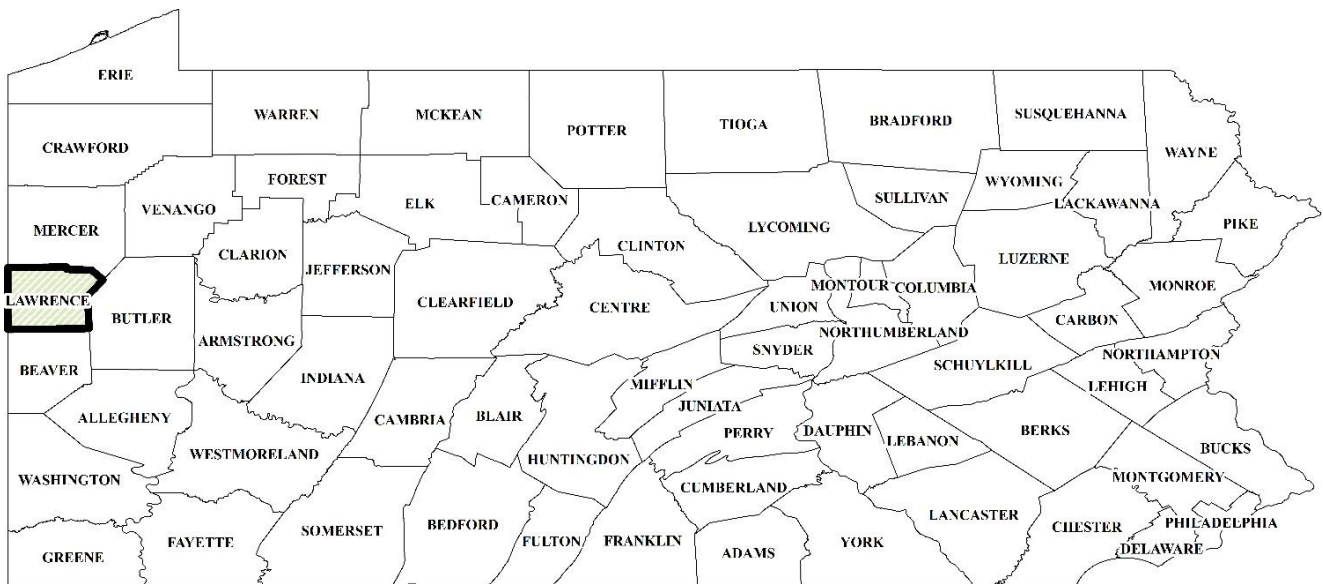


Figure B-42. New Castle, PA Micro Area Site Detail

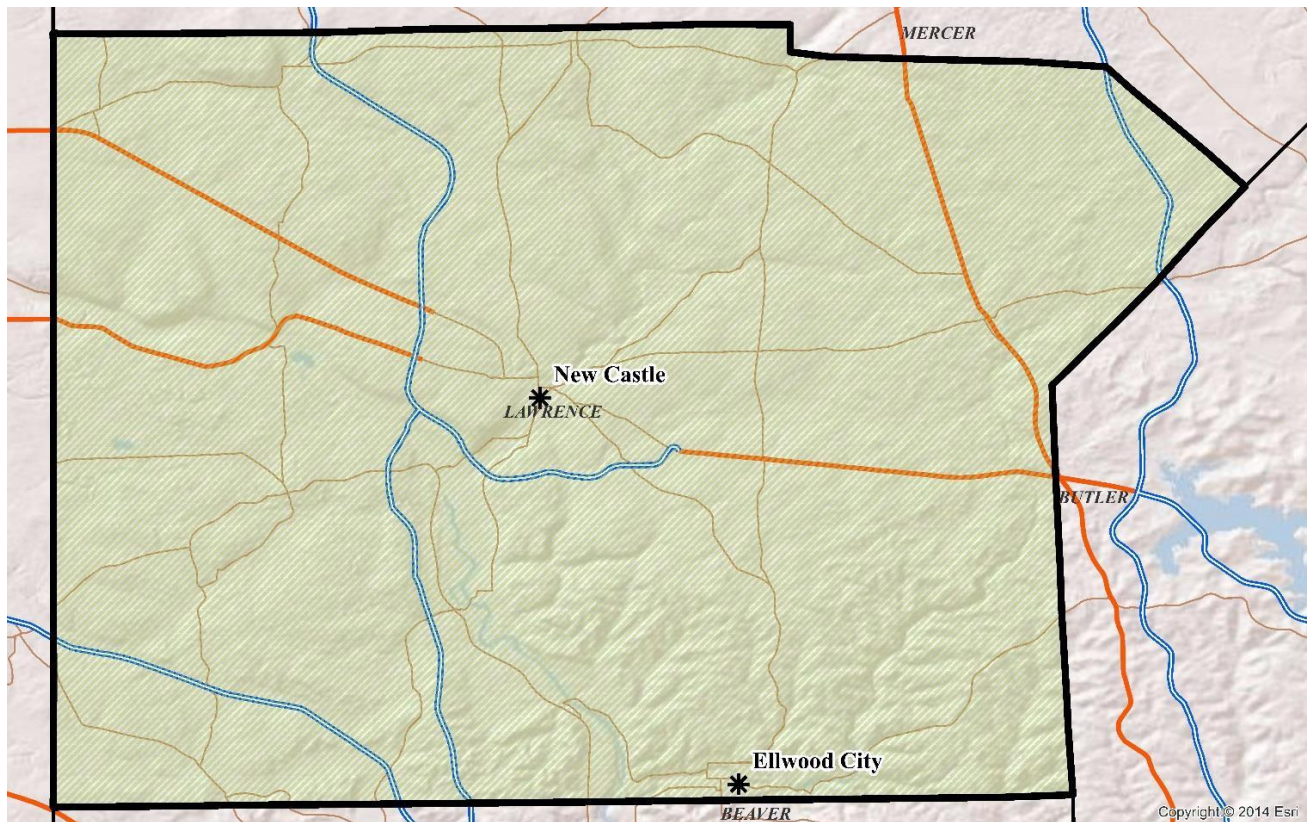


Figure B-43. Overview of the Sayre, PA Micro Area

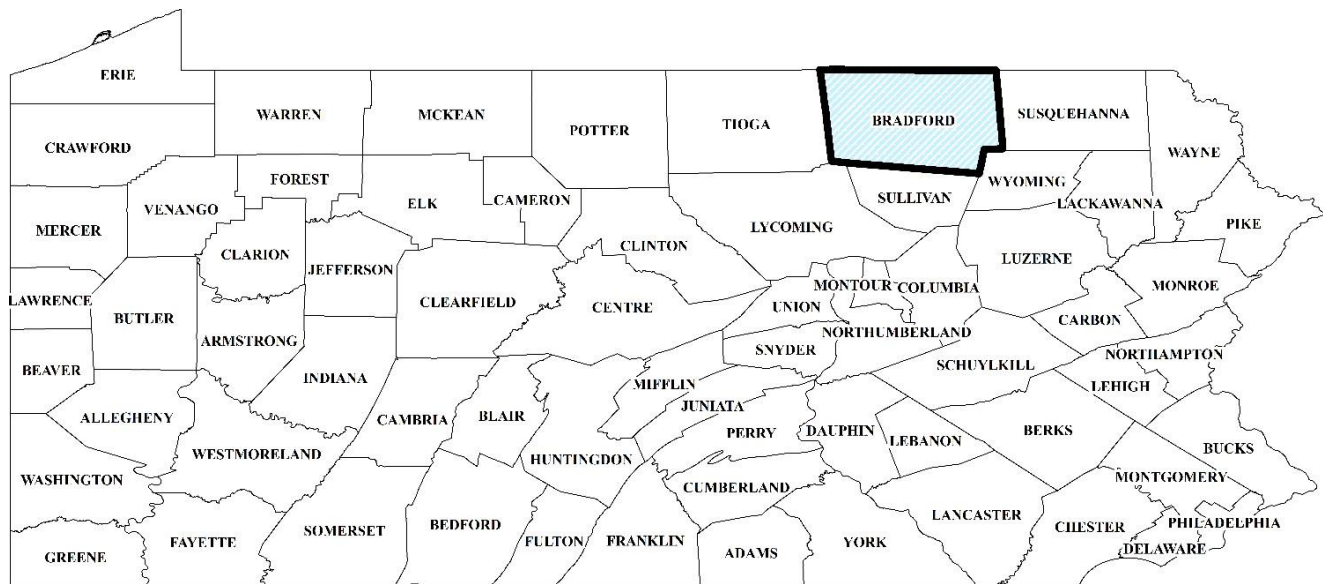


Figure B-44. Sayre, PA Micro Area Site Detail

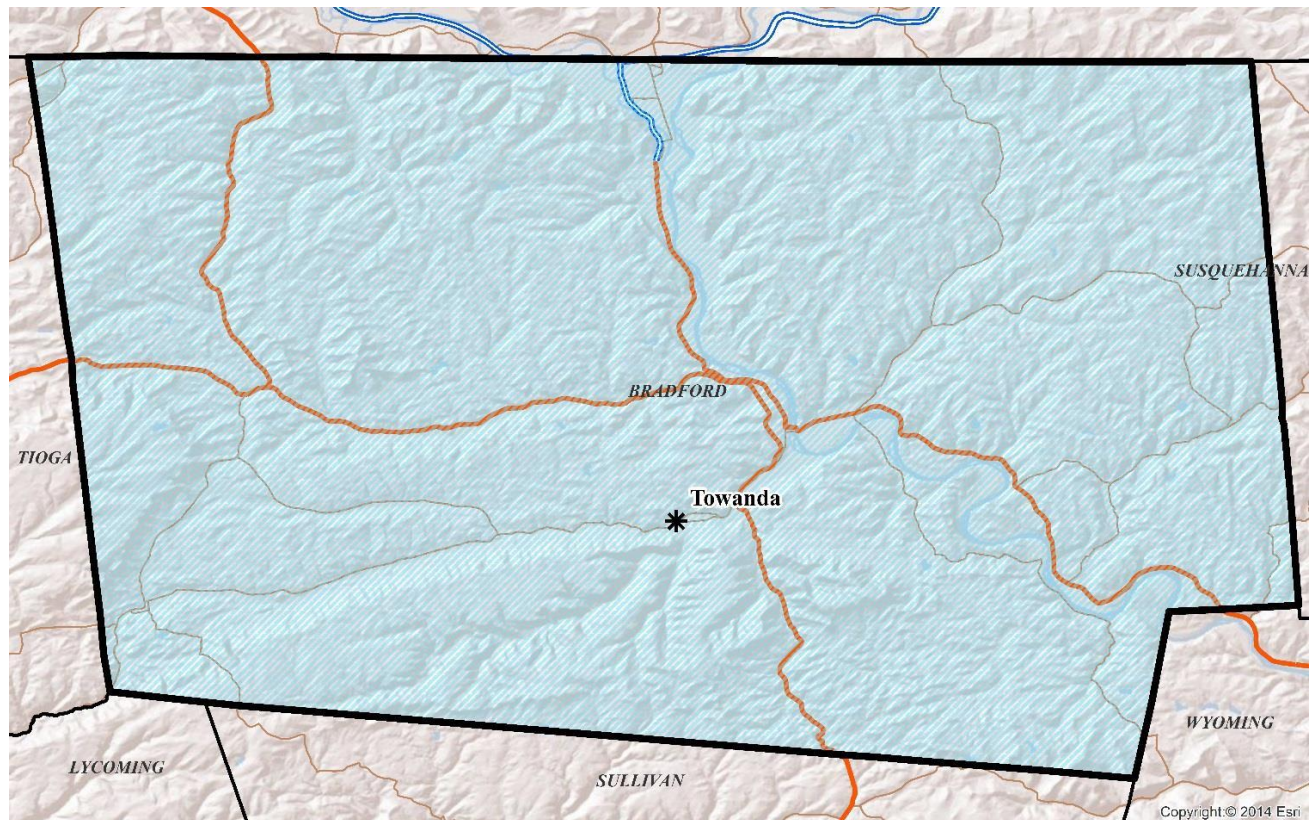


Figure B-45. Overview of the Warren, PA Micro Area

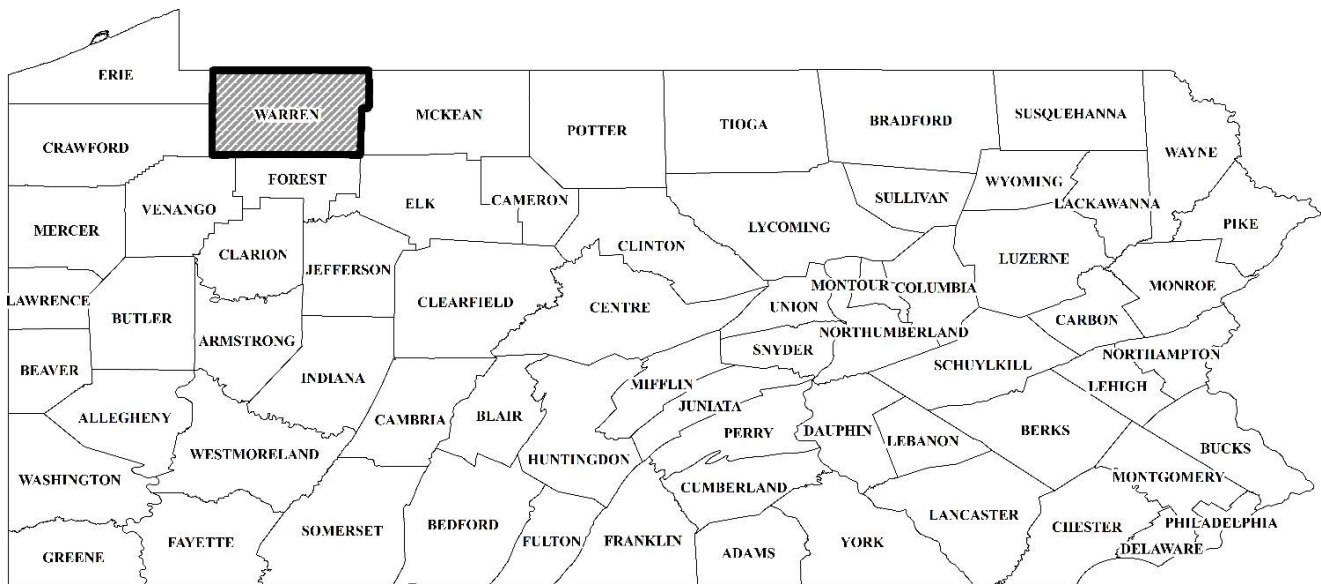


Figure B-46. Warren, PA Micro Area Site Detail

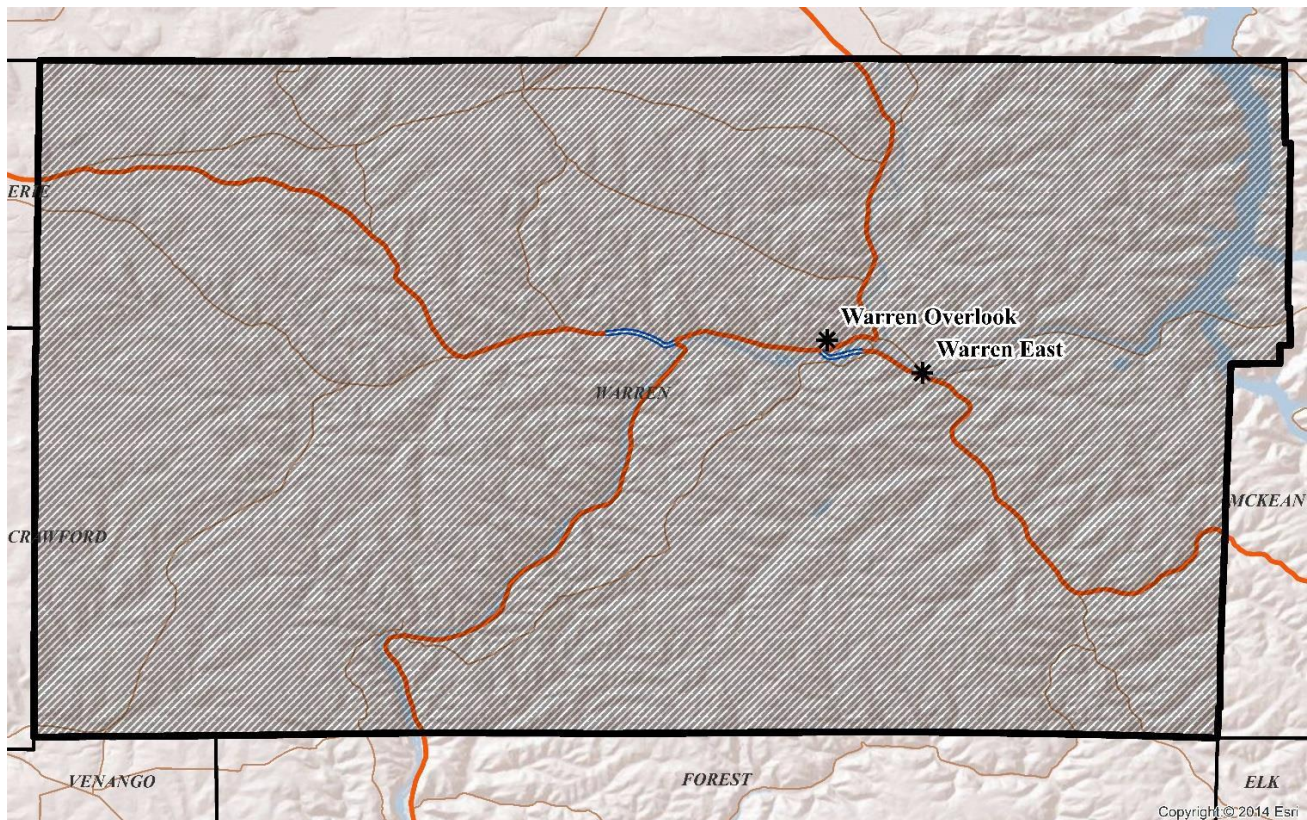


Figure B-47. Overview of the Northcentral Non-CBSA Region

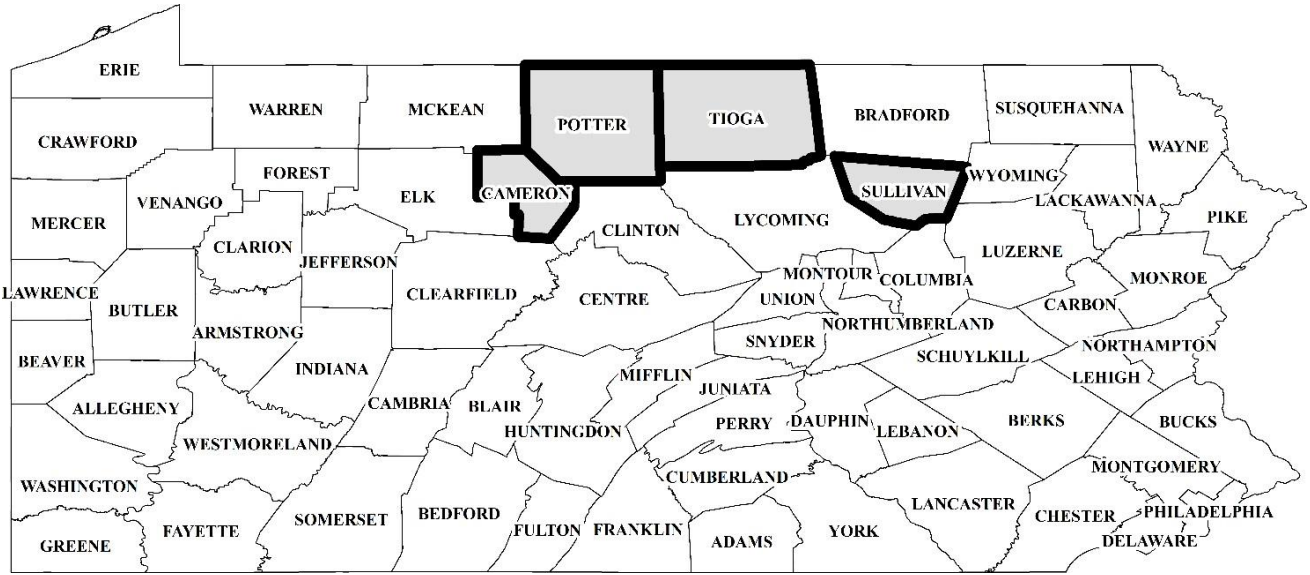


Figure B-48. Northcentral Non-CBSA Region Site Detail

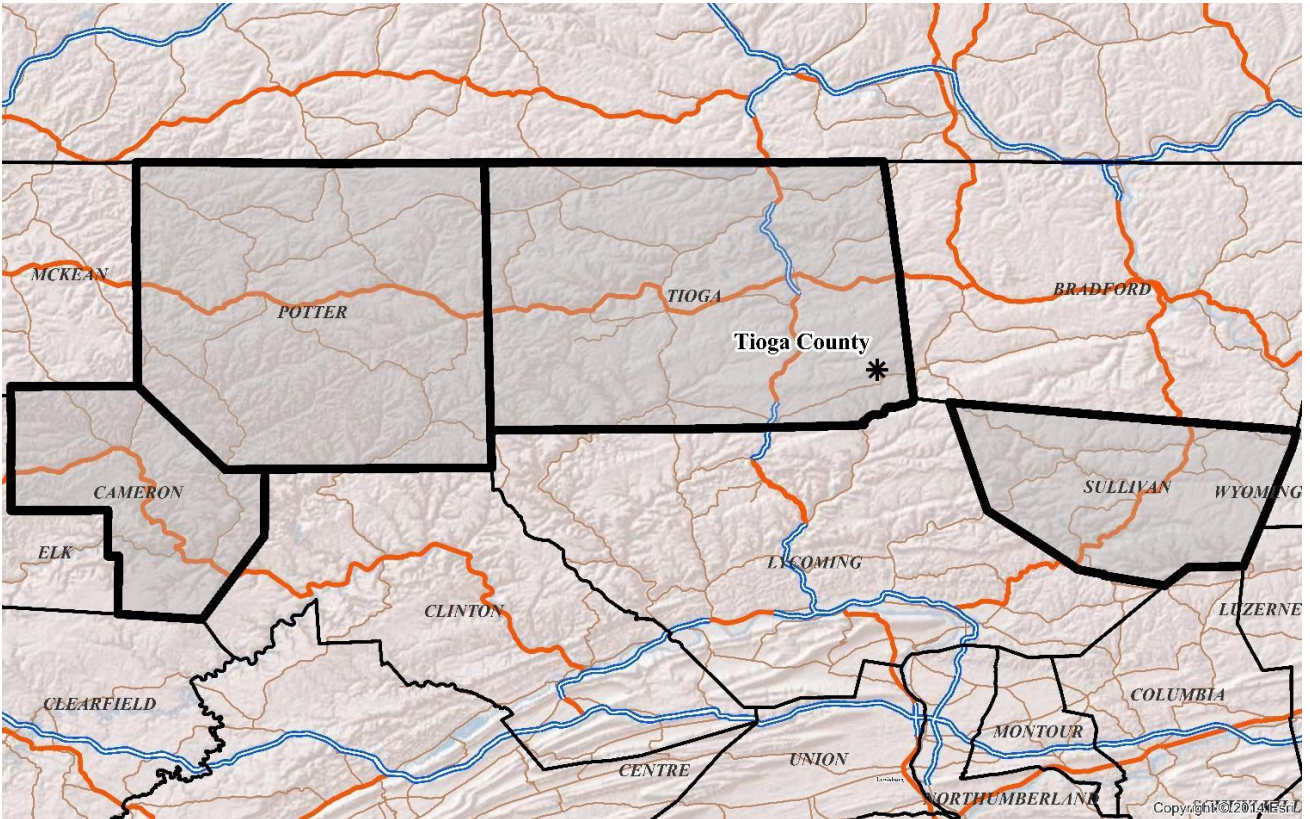


Figure B-49. Overview of the Northeast Non-CBSA Region

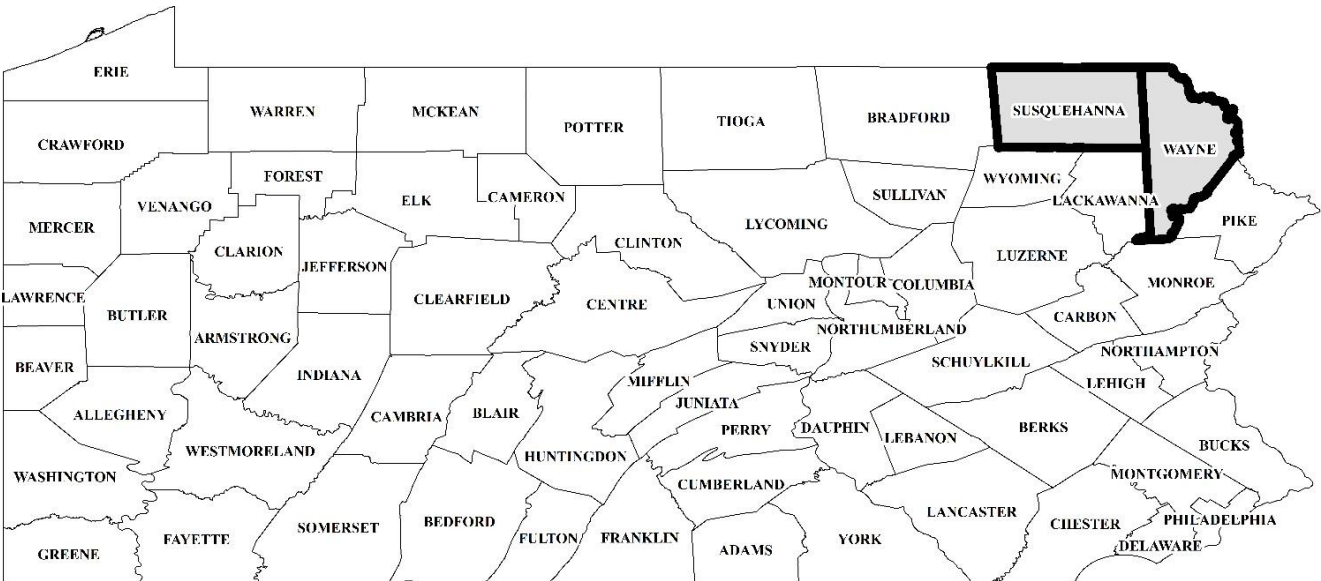


Figure B-50. Northeast Non-CBSA Region Site Detail

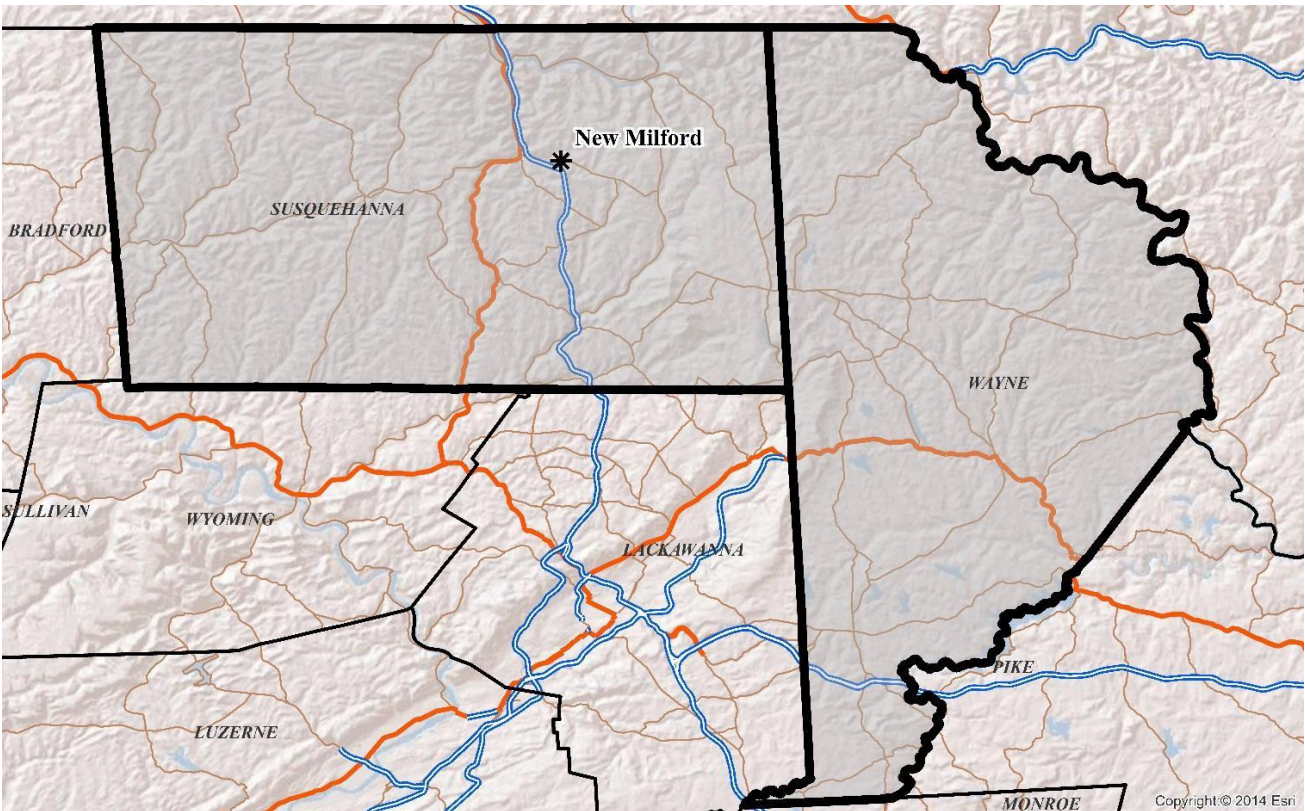


Figure B-51. Overview of the Southwest Non-CBSA Region

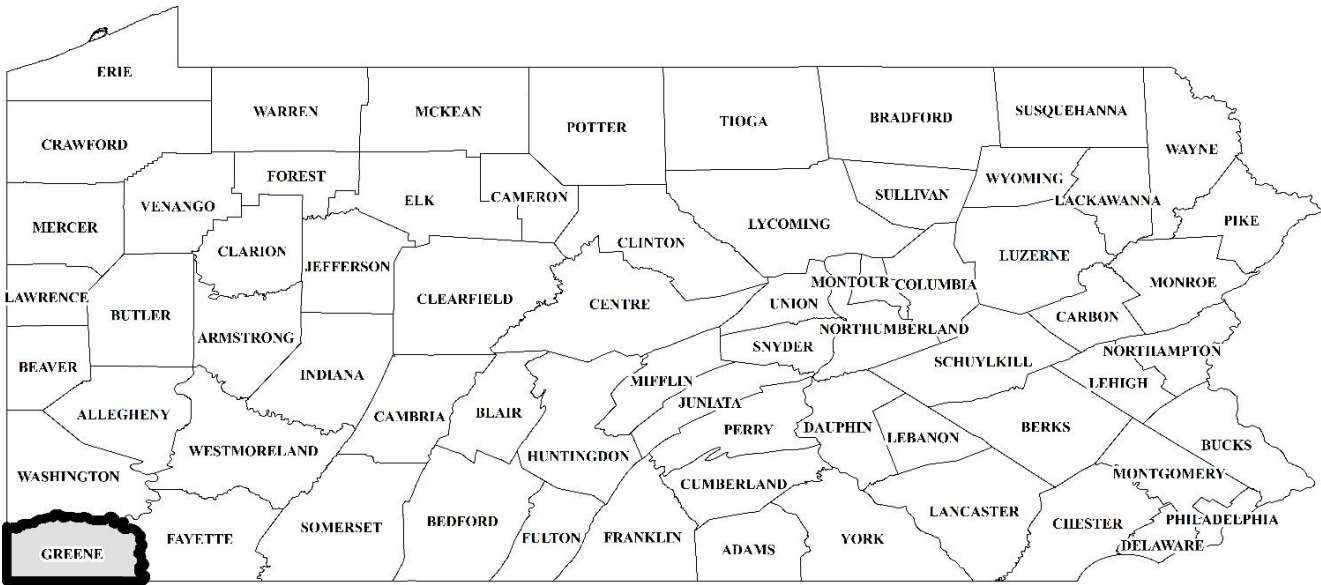
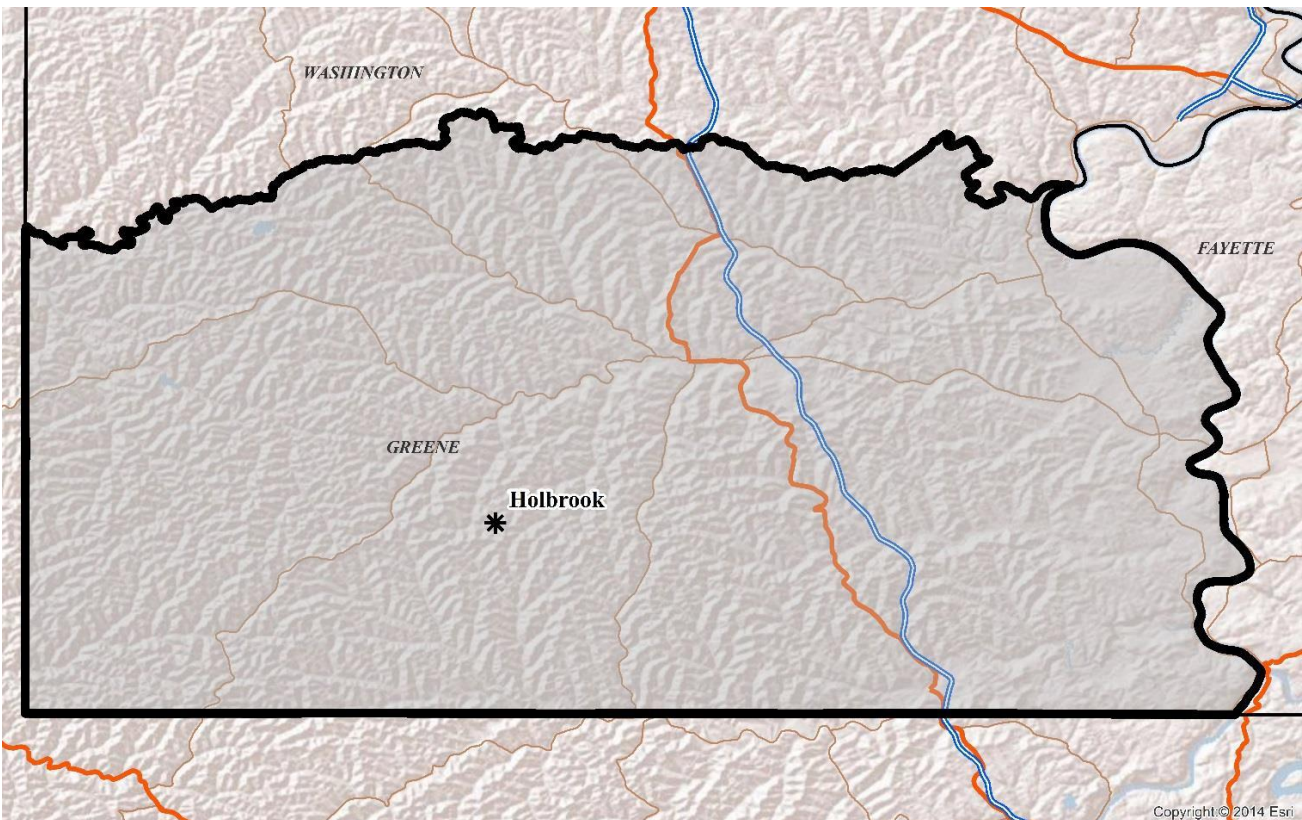


Figure B-52. Southwest Non-CBSA Region Site Detail



Appendix C – Network Design and Quality Assurance Criteria

DEP operates its air monitoring network in accordance with all applicable requirements set forth in 40 CFR Part 58, Appendices A, B, C, D, and E.

Quality Assurance Requirements– 40 CFR Part 58, Appendix A

DEP operates its Ambient Air Monitoring Network in accordance with all quality assurance requirements set forth in 40 CFR Part 58, Appendix A, “Quality Assurance Requirements for Monitors used in Evaluations of National Ambient Air Quality Standards.”

DEP has submitted Quality Assurance Project Plans (QAPP) to EPA for all criteria monitoring networks and follows the quality assurance requirements and procedures as described therein. Quality assurance data, including results from precision checks, flow rate verifications and monitor performance audits are submitted to EPA electronically, through its Air Quality System (AQS).

Collocated monitoring requirements for particulate pollutant monitoring are set forth in 40 CFR Part 58, Appendix A. These requirements are used to determine precision for the PM_{2.5} and Lead monitoring networks. A collocated monitoring requirement for PM₁₀ monitoring is also included in 40 CFR Part 58, Appendix A. This requirement is applicable only to manual method PM₁₀ monitors. All of DEP's PM₁₀ monitoring sites employ continuous monitoring methods. As there is no collocated requirement for continuous method monitoring, DEP is not required to maintain a collocated PM₁₀ monitoring site.

Fine Particulate Matter (PM_{2.5}) Collocated Monitoring Requirements

Collocated PM_{2.5} monitoring requirements are set forth in 40 CFR Part 58, Appendix A as follows:

“3.2.3 Collocated Quality Control Sampling Procedures for PM_{2.5}. For each pair of collocated monitors, designate one sampler as the primary monitor whose concentrations will be used to report air quality for the site, and designate the other as the quality control monitor. There can be only one primary monitor at a monitoring site for a given time period.

3.2.3.1 For each distinct monitoring method designation (FRM or FEM) that a PQAO is using for a primary monitor, the PQAO must have 15 percent of the primary monitors of each method designation collocated (values of 0.5 and greater round up); and have at least one collocated quality control monitor (if the total number of monitors is less than three). The first collocated monitor must be a designated FRM monitor.

3.2.3.2 In addition, monitors selected for collocation must also meet the following requirements:

(a) A primary monitor designated as an EPA FRM shall be collocated with a quality control monitor having the same EPA FRM method designation.

(b) For each primary monitor designated as an EPA FEM used by the PQAO, 50 percent of the monitors designated for collocation, or the first if only one collocation is necessary, shall be collocated with a FRM quality control monitor and 50 percent of the monitors shall be collocated with a monitor having the same method designation as the FEM primary monitor. If an odd number of collocated monitors is required, the additional monitor shall be a FRM quality control monitor.

[...]

3.2.3.4 The collocated monitors should be deployed according to the following protocol:

(a) Fifty percent of the collocated quality control monitors should be deployed at sites with annual average or daily concentrations estimated to be within plus or minus 20 percent of either the annual or 24-hour NAAQS and the remainder at the PQAOs discretion;

[...]

(d) Sample the collocated quality control monitor on a 1-in-12 day schedule. Report the measurements from both primary and collocated quality control monitors at each collocated sampling site to AQS

[...].”

DEP performs all PM_{2.5} continuous monitoring using Federal Equivalent Methods (FEM). All continuous monitors are subject to NAAQS comparison, following the site-level summary statistic procedures set forth in 40 CFR, Part 50, Appendix N, “Interpretation of the National Ambient Air Quality Standards for PM_{2.5}.”

Table C-1 displays the total number of quality assurance collocated sites operated by DEP, in relation to the 15% by method requirement in 40 CFR Part 58, Appendix A, § 3.2.3.1. This table includes information for the proposed 2020-2021 monitoring network. As shown, DEP currently meets the 15% collocation by method requirement.

Table C-1. PM_{2.5} QA-Collocated Monitoring Minimum Requirements Demonstration

Primary Monitor Method	Total No. of DEP PM _{2.5} Sites	15%	No. of DEP QA-Collocated PM _{2.5} Monitors	No. of Addtl QA-Collocated PM _{2.5} Monitors Needed
R&P 2025 (FRM)	8	1	1	0
Teledyne 602 Beta+	4	1	1	0
Teledyne T640	22	3	3	0

Table C-2 provides details of quality assurance collocated PM_{2.5} sites operated by DEP, in relation to the collocation monitor designation requirements in 40 CFR Part 58, Appendix A, § 3.2.3.2. As shown, DEP currently meets the collocated method designation requirements.

Table C-2. PM_{2.5} QA-Collocated Monitoring Method Requirements Demonstration

Site Name	Primary PM _{2.5} Monitor Method	QA-Collocated PM _{2.5} Monitor Method
Lancaster	R&P 2025 (FRM)	R&P 2025 (FRM)
Harrisburg	Teledyne 602 Beta+	R&P 2025 (FRM)
Chester	Teledyne T640	R&P 2025 (FRM)
New Garden	Teledyne T640	R&P 2025 (FRM)
Johnstown	Teledyne T640	Teledyne T640

Table C-3 provides details of quality assurance collocated sites operated by DEP, in relation to the measurement concentration collocation requirements in 40 CFR Part 58, Appendix A, § 3.2.3.4. DEP meets these requirements.

Table C-3. PM_{2.5} QA-Collocated Monitoring Site Selection Requirements Demonstration

Site Name	24-Hour NAAQS	+/- 20% 24-Hour NAAQS	2018 Daily Design Value	Annual NAAQS	+/- 20% Annual NAAQS	2018 Annual Design Value
Lancaster	35 µg/m ³	28 – 42 µg/m ³	25 µg/m ³	12.0 µg/m ³	9.6 - 14.4 µg/m ³	9.1 µg/m ³
Harrisburg			23 µg/m ³			8.6 µg/m ³
Chester			24 µg/m ³			10.7 µg/m ³
New Garden			23 µg/m ³			9.7 µg/m ³
Johnstown			22 µg/m ³			9.7 µg/m ³

DEP operates all QA-collocated PM_{2.5} monitors at a minimum of a 1-in-6 day schedule and reports concentration measurement data from these sites to EPA via the AQS database.

Lead (Pb) Network Collocated Monitoring Requirements

Collocated lead monitoring requirements are set forth in 40 CFR Part 58, Appendix A as follows:

“3.4.4 Collocated Quality Control Sampling for TSP Pb for monitoring sites other than non-source oriented NCore. For each pair of collocated monitors for manual TSP Pb samplers, designate one sampler as the primary monitor whose concentrations will be used to report air quality for the site, and designate the other as the quality control monitor.

3.4.4.1 A PQAO must:

(a) Have 15 percent of the primary monitors (not counting non-source oriented NCore sites in PQAO) collocated. Values of 0.5 and greater round up; and

(b) Have at least one collocated quality control monitor (if the total number of monitors is less than three).

3.4.4.2 The collocated quality control monitors should be deployed according to the following protocol:

(a) The first collocated Pb site selected must be the site measuring the highest Pb concentrations in the network. If the site is impractical, alternative sites, approved by the EPA Regional Administrator, may be selected. If additional collocated sites are necessary, collocated sites may be chosen that reflect average ambient air Pb concentrations in the network.”

DEP currently maintains two QA-collocated sites in its lead monitoring network, Palmerton and Laureldale North (Berks County). Table C-4 provides details of number of quality assurance collocated lead sites operated by DEP, in relation to the collocation monitor designation requirements in 40 CFR Part 58, Appendix A, § 3.4.4.1. As shown, DEP meets the 15% requirement noted above.

Table C-4. Lead Collocated Monitoring Minimum Requirements Demonstration

Total No. of DEP Lead Monitoring Sites	15%	No. of DEP QA-Collocated Lead Monitors	Add'l QA-Collocated Lead Monitors Needed
12*/11	2	2	0

* DEP plans to discontinue the Potter Township site, as described in the "Modifications to Criteria Pollutant Networks" section of its 2019 Annual Network Plan.

Table C-5 displays the highest 3-month averages between 2016-2018, representing the 2018 design value period. As shown, DEP meets the requirements set forth in 40 CFR Part 58, Appendix A, § 3.4.4.2 by maintaining a QA-collocated monitor at its highest value site, Palmerton.

Table C-5. DEP Lead Concentration Values, 2016-2018

Station	County	Design Value (µg/m ³)	2016 Max 3-Month Avg (µg/m ³)	2017 Max 3-Month Avg (µg/m ³)	2018 Max 3-Month Avg (µg/m ³)
Beaver Valley	Beaver	0.01*	0.01	0.01	0.00
Chester	Delaware	0.01*	0.01	0.01	0.00
Conemaugh	Westmoreland	0.01*	0.01	0.01	0.00
Ellwood City	Lawrence	0.03	0.03	0.03	0.03
Laureldale North	Berks	0.05	0.03	0.05	0.01
Laureldale South	Berks	0.01	0.01	0.01	0.01
Lyons Boro	Berks	0.03	0.03	0.03	0.02
Lyons Park	Berks	0.02	0.02	0.02	0.01
Mt. Joy	Lancaster	0.07	0.07	0.07	0.06
Palmerton	Carbon	0.13	0.11	0.09	0.13
Potter Township**	Beaver	0.01	0.01	0.01	0.00
Vanport	Beaver	0.02	0.02	0.01	0.00

* Does not meet completeness requirements

** DEP plans to discontinue the Potter Township site, as described in the "Modifications to Criteria Pollutant Networks" section of its 2019 Annual Network Plan.

Quality Assurance Requirements – 40 CFR Part 58, Appendix B

DEP does not operate Prevention of Significant Deterioration (PSD) monitors as part of its Ambient Air Monitoring Network. Therefore, 40 CFR Part 58, Appendix B, "Quality Assurance Requirements for Prevention of Significant Deterioration (PSD) Air Monitoring," is not applicable.

Monitoring Method Requirements – 40 CFR Part 58, Appendix C

DEP operates its Ambient Air Monitoring Network in accordance with all monitoring method requirements set forth in 40 CFR Part 58, Appendix C, "Ambient Air Quality Monitoring Methodology." DEP uses EPA-approved Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM) to perform all ambient air monitoring. Monitoring methods are listed in Appendix D of this document.

Network Design Requirements – 40 CFR Part 58, Appendix D

DEP operates its Ambient Air Monitoring Network in accordance with all network design requirements set forth in 40 CFR Part 58, Appendix D, “Network Design Criteria for Ambient Air Quality Monitoring.” The following subsections detail network design requirements for all criteria pollutants. As indicated in 40 CFR Part 58.20, Special Purpose Monitors (SPM) are not included in determining compliance with minimum monitoring requirements.

Ozone (O₃) Network Design Requirements

Minimum ozone monitoring requirements are set forth in 40 CFR Part 58, Appendix D Section 4.1, “Ozone Design Criteria,” as follows:

“4.1 Ozone (O₃) Design Criteria. (a) State, and where appropriate, local agencies must operate O₃ sites for various locations depending upon area size (in terms of population and geographic characteristics) and typical peak concentrations (expressed in percentages below, or near the O₃ NAAQS). Specific SLAMS O₃ site minimum requirements are included in Table D-2 of this appendix. The NCore sites are expected to complement the O₃ data collection that takes place at single-pollutant SLAMS sites, and both types of sites can be used to meet the network minimum requirements. The total number of O₃ sites needed to support the basic monitoring objectives of public data reporting, air quality mapping, compliance, and understanding O₃-related atmospheric processes will include more sites than these minimum numbers required in Table D-2 of this appendix. The EPA Regional Administrator and the responsible State or local air monitoring agency must work together to design and/or maintain the most appropriate O₃ network to service the variety of data needs in an area.”

Table C-6. Minimum Ozone Monitoring Requirements

(Table D-2 of Appendix D to Part 58— SLAMS Minimum O₃ Monitoring Requirements)

MSA population ^{1,2}	Most recent 3-year design value concentrations \geq85% of any O₃ NAAQS ³	Most recent 3-year design value concentrations $<$85% of any O₃ NAAQS ^{3,4}
>10 million	4	2
4-10 million	3	1
350,000-<4 million	2	1
50,000-<350,000 ⁵	1	0

¹ Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

² Population based on latest available census figures.

³ The ozone (O₃) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

⁴ These minimum monitoring requirements apply in the absence of a design value.

⁵ Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

These minimum ozone monitoring requirements are satisfied as detailed in Table C-7. Ambient air monitoring sites operated by agencies other than DEP are included in the “Other SLAMS Monitors” and “CASTNET Monitors” columns of the table. Any changes to the DEP ozone monitoring network described in this plan are included in the table. As shown, the number of ozone monitoring sites within the twenty Pennsylvania MSAs meets or exceeds the minimum monitoring requirement. In addition, the total ozone monitoring network encompasses a substantially greater number of monitoring sites than the minimum requirement, and includes several micropolitan areas and non-MSA regions of the state.

Table C-7. Ozone Minimum Monitoring Requirements Demonstration, 2020-2021

MSA	2018 Population Estimate	Maximum 2018 Design Value	No. of Monitors Required	DEP SLAMS Monitors	Other SLAMS Monitors	Total No. SLAMS Monitors	CASTNET Monitors	Add'l Monitors Needed
Allentown-Bethlehem-Easton MSA	842,913	71	2	2	NJ-1	3		0
Altoona MSA	122,492	63	1	1		1		0
Bloomsburg-Berwick MSA	83,696	No monitors	0	0		0		0
Chambersburg-Waynesboro MSA	154,835	59	0	1		1		0
East Stroudsburg MSA	169,507	68	1	1		1		0
Erie MSA	272,061	64	1	1		1		0
Gettysburg MSA	102,811	67	1	1		2	PA-1	0
Harrisburg-Carlisle MSA	574,659	65	2	2		2		0
Johnstown MSA	131,730	61	1	1		1		0
Lancaster MSA	543,557	69	2	2		2		0
Lebanon MSA	141,314	68	1	1		1		0
New York-Newark-Jersey City MSA	19,979,477	77	4	0	NJ-9; NY-14	23		0
Philadelphia-Camden-Wilmington MSA	6,096,372	81	3	4	AMS-3; DE-4; MD-1; NJ-3	15		0
Pittsburgh MSA	2,324,743	71	2	9	ACHD-3	12		0
Reading MSA	420,152	70	2	2		2		0
Scranton-Wilkes-Barre-Hazleton MSA	555,485	64	2	3		3		0
State College MSA	162,805	64	1	1		2	PA-1	0
Williamsport MSA	113,664	63	1	1		1		0
York-Hanover MSA	448,273	67	2	2		2		0
Youngstown-Warren-Boardman MSA	538,952	69	2	1	OH-3	5	PA-1	0
DuBois, PA Micro Area	79,388	64	N/A	1		1		N/A
Indiana, PA Micro Area	84,501	69	N/A	1		1		N/A
New Castle, PA Micro Area	86,184	65	N/A	1		1		N/A
Sayre, PA Micro Area	60,833	59	N/A	1		1		N/A
Somerset, PA Micro Area	73,952	65	N/A	0		1	PA-1	N/A
St. Marys, PA Micro Area	30,169	65	N/A	0		1	PA-1	N/A
Northcentral Non-MSA Region	N/A	64	N/A	1		1		N/A
Southwest Non-MSA Region	N/A	66	N/A	1		1		N/A

Additional ozone monitoring requirements for maximum ozone concentration monitoring are set forth in 40 CFR Part 58, Appendix D, § 4.1 as follows:

“(b) Within an O₃ network, at least one O₃ site for each MSA, or CSA if multiple MSAs are involved, must be designed to record the maximum concentration for that particular metropolitan area. More than one maximum concentration site may be necessary in some areas. Table D-2 of this appendix does not account for the full breadth of additional factors that would be considered in designing a complete O₃ monitoring program for an area. Some of these additional factors include geographic size, population density, complexity of terrain and meteorology, adjacent O₃ monitoring programs, air pollution transport from neighboring areas, and measured air quality in comparison to all forms of the O₃ NAAQS (i.e., 8-hour and 1-hour forms). Networks must be designed to account for all of these area characteristics. Network designs must be re-examined in periodic network assessments. Deviations from the above O₃ requirements are allowed if approved by the EPA Regional Administrator.”

Seventeen of Pennsylvania's twenty MSAs are incorporated into Combined Statistical Areas (CSA), as defined by the U.S. Office of Management and Budget (OMB). Pennsylvania encompasses eleven CSAs, either wholly or in part. CSA include both MSAs and Micropolitan areas, and often encompass multiple states. Table C-8 displays Pennsylvania's CSAs and their component Pennsylvania MSAs, and identifies the ozone maximum concentration sites. As noted in the table, three MSAs are not included in any CSA

Table C-8. Combined Statistical Areas (CSA), MSAs and Maximum Ozone Concentration Sites

CSA Name	Component MSA Name, Pennsylvania Portion	Max Ozone Site	AQS ID
Bloomsburg-Berwick-Sunbury, PA	Bloomsburg-Berwick, PA (MSA) Lewisburg, PA (Micropolitan) Selinsgrove, PA (Micropolitan) Sunbury, PA (Micropolitan)	<i>No monitoring required 40 CFR Part 58 Section 4.1</i>	
Erie-Meadville, PA	Erie, PA (MSA) Meadville, PA (Micropolitan)	Erie ¹	420490003
Harrisburg-York-Lebanon, PA	Gettysburg, PA (MSA)	Lebanon	420750100
	Harrisburg-Carlisle, PA (MSA)		
	Lebanon, PA (MSA)		
	York-Hanover, PA (MSA)		
Johnstown-Somerset, PA	Johnstown, PA (MSA) Somerset, PA (Micropolitan)	Johnstown ¹	420210011
New York-Newark, NY-NJ-CT-PA	Allentown-Bethlehem-Easton, PA-NJ (MSA)	<i>Area of expected maximum ozone concentrations occurs in CT</i>	
	East Stroudsburg, PA (MSA)		
	New York-Newark-Jersey City, NY-NJ-PA (MSA)		
Philadelphia-Reading-Camden, PA-NJ-DE-MD	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD (MSA)	Bristol	420170012
	Reading, PA (MSA)		
Pittsburgh-New Castle-Weirton, PA-OH-WV	Indiana, PA (Micropolitan) New Castle, PA (Micropolitan) Pittsburgh, PA (MSA)	Harrison 2	420031008

CSA Name	Component MSA Name, Pennsylvania Portion	Max Ozone Site	AQS ID
State College-DuBois, PA	DuBois, PA (Micropolitan) State College, PA (MSA)	State College ¹	420270100
Washington-Baltimore-Arlington, DC-MD-VA-WV-PA	Chambersburg-Waynesboro, PA (MSA)	<i>Area of expected maximum ozone concentrations occurs in MD</i>	
Williamsport-Lock Haven, PA	Lock Haven, PA (Micropolitan) Williamsport, PA (MSA)	Montoursville ¹	420810100
Youngstown-Warren, OH-PA	Youngstown-Warren-Boardman, OH-PA (MSA)	Farrell	420850100
<i>Not in a CSA</i>	Altoona, PA (MSA)	Altoona	420130801
	Lancaster, PA (MSA)	Lancaster Downwind	420710012
	Scranton-Wilkes-Barre-Hazleton, PA (MSA)	Peckville	420690101

¹ Monitor located in population center of CSA. Monitor may not be in area of expected ozone maximum concentration (downwind of urban center); however, monitor is located to represent ozone exposure occurring to majority of CSA population

Sulfur Dioxide (SO₂) Network Design Requirements

Minimum SO₂ monitoring requirements are set forth in 40 CFR Part 58, Appendix D as follows:

“4.4.2 Requirement for Monitoring by the Population Weighted Emissions Index. (a) The population weighted emissions index (PWEI) shall be calculated by States for each core based statistical area (CBSA) they contain or share with another State or States for use in the implementation of or adjustment to the SO₂ monitoring network. The PWEI shall be calculated by multiplying the population of each CBSA, using the most current census data or estimates, and the total amount of SO₂ in tons per year emitted within the CBSA area, using an aggregate of the most recent county level emissions data available in the National Emissions Inventory for each county in each CBSA. The resulting product shall be divided by one million, providing a PWEI value, the units of which are million persons-tons per year. For any CBSA with a calculated PWEI value equal to or greater than 1,000,000, a minimum of three SO₂ monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 100,000, but less than 1,000,000, a minimum of two SO₂ monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO₂ monitor is required within that CBSA.”

These minimum SO₂ monitoring requirements are satisfied as detailed in Table C-9. PWEI values were calculated using the 2014 National Emissions Inventory (NEI) database, which is the most recent data available. Ambient air monitoring sites operated by agencies other than DEP are listed in the “Other SLAMS Monitors” column of the table. Any changes to the DEP SO₂ monitoring network described in this plan are included in the table. As shown, the number of SO₂ monitoring sites within the thirty-seven Pennsylvania CBSAs meets or exceeds the minimum monitoring requirement. In addition, the total SO₂ monitoring network encompasses a greater number of monitoring sites than the minimum requirement.

Table C-9. SO₂ Minimum Monitoring Requirements Demonstration, 2020-2021

CBSA	2018 Population Estimate	2014 NEI (tons/year)	Calculated PWEI	No. of Monitors Required	DEP SLAMS Monitors	Other SLAMS Monitors	Total No. of Monitors	Add'l Monitors Needed
Allentown-Bethlehem-Easton MSA	842,913	9744.8	8214	1	1	NJ-1	2	0
Altoona MSA	122,492	4206.6	515	0	1		1	0
Bloomsburg-Berwick MSA	83,696	11332	948	0	0		0	0
Chambersburg-Waynesboro MSA	154,835	315.4	49	0	0		0	0
East Stroudsburg MSA	169,507	312.8	53	0	0		0	0
Erie MSA	272,061	280.4	76	0	0		0	0
Gettysburg MSA	102,811	161.5	17	0	1		1	0
Harrisburg-Carlisle MSA	574,659	1615	928	0	0		0	0
Johnstown MSA	131,730	8267.3	1089	0	1		1	0
Lancaster MSA	543,557	877.8	477	0	0		0	0
Lebanon MSA	141,314	576.4	81	0	0		0	0
New York-Newark-Jersey City MSA	19,979,477	109.2	2182	0	0	NJ-6; NY-7	13	0
Philadelphia-Camden-Wilmington MSA	6,096,372	8080.4	49261	1	0	AMS-2; DE-4; NJ-1	7	0
Pittsburgh MSA	2,324,743	62549.8	145412	2	4	ACHD-5	9	0
Reading MSA	420,152	1452.7	610	0	1		1	0
Scranton-Wilkes-Barre-Hazleton MSA	555,485	1487.3	826	0	1		1	0
State College MSA	162,805	1545.5	252	0	1		1	0
Williamsport MSA	113,664	928.4	106	0	0		0	0
York-Hanover MSA	448,273	18636.6	8354	1	1		1	0
Youngstown-Warren-Boardman MSA	538,952	183.7	99	0	0	OH-1	1	0
Bradford, PA Micro Area	40,968	2255.5	92	0	0		0	0
DuBois, PA Micro Area	79,388	37294.6	2961	0	0		0	0
Huntingdon, PA Micro Area	45,168	274.1	12	0	0		0	0
Indiana, PA Micro Area	84,501	135547.3	11454	1	1		1	0
Lewisburg, PA Micro Area	44,785	105.4	5	0	0		0	0
Lewistown, PA Micro Area	46,222	152.2	7	0	0		0	0
Lock Haven, PA Micro Area	38,684	118.3	5	0	0		0	0
Meadville, PA Micro Area	85,063	450.7	38	0	0		0	0
New Castle, PA Micro Area	86,184	4141.9	357	0	0		0	0
Oil City, PA Micro Area	51,266	1722.8	88	0	0		0	0

CBSA	2018 Population Estimate	2014 NEI (tons/year)	Calculated PWEI	No. of Monitors Required	DEP SLAMS Monitors	Other SLAMS Monitors	Total No. of Monitors	Add'l Monitors Needed
Pottsville, PA Micro Area	142,067	5001.3	711	0	0		0	0
Sayre, PA Micro Area	60,833	733.8	45	0	0		0	0
Selinsgrove, PA Micro Area	40,540	1626.2	66	0	0		0	0
Somerset, PA Micro Area	73,952	259.5	19	0	0		0	0
St. Marys, PA Micro Area	30,169	622.4	19	0	0		0	0
Sunbury, PA Micro Area	91,083	720.5	66	0	0		0	0
Warren, PA Micro Area	39,498	954.1	38	0	2		2	0

Nitrogen Dioxide (NO₂) Network Design Requirements

Minimum NO₂ monitoring requirements include requirements for near-road, area-wide and EPA Regional Administrator Required monitoring.

Near-Road NO₂ Monitoring

On December 22, 2016, EPA finalized revisions to the minimum monitoring requirements for near-road NO₂ monitors. The revision removes the existing requirement for near-road NO₂ monitoring stations in Core Based Statistical Areas (CBSAs) having populations between 500,000 and 1,000,000 persons. These monitors were due to have been installed and operational by January 1, 2017 (81 FR 96381).⁷ Near-road NO₂ monitoring requirements are set forth in 40 CFR Part 58, Appendix D as follows:

“4.3.2 Requirement for Near-road NO₂ Monitors

a) Within the NO₂ network, there must be one microscale near-road NO₂ monitoring station in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected maximum hourly concentrations sited near a major road with high AADT counts as specified in paragraph 4.3.2(a)(1) of this appendix. An additional near-road NO₂ monitoring station is required for any CBSA with a population of 2,500,000 persons or more, or in any CBSA with a population of 1,000,000 or more persons that has one or more roadway segments with 250,000 or greater AADT counts to monitor a second location of expected maximum hourly concentrations. CBSA populations shall be based on the latest available census figures.”

The Commonwealth of Pennsylvania contains three MSAs (Figure 1), either wholly or in part, with populations greater than 1,000,000 persons. These three MSA are the New York-Newark-Jersey City, NY-NJ-PA MSA, the Philadelphia-Camden-Wilmington, PA-NJ-DE-MD MSA, and the Pittsburgh, PA MSA. NO₂ near-road monitoring for the New York-Newark-Jersey City MSA is performed by the New Jersey Department of Environmental Protection. NO₂ near-road monitoring for the Pennsylvania portion of the Philadelphia-Camden-Wilmington MSA is performed by Philadelphia Air Management Services. NO₂ near-road monitoring for the Pittsburgh MSA is performed by the Allegheny County

⁷<https://www.govinfo.gov/content/pkg/FR-2016-12-30/pdf/2016-31645.pdf>.

Health Department. Near-road NO₂ monitoring network sites for these MSAs are described in the annual air monitoring network plans of these agencies.

Area-Wide NO₂ Monitoring

Area-wide NO₂ monitoring requirements are set forth in 40 CFR Part 58, Appendix D as follows:

“4.3.3 Requirement for Area-wide NO₂ Monitoring

(a) Within the NO₂ network, there must be one monitoring station in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected highest NO₂ concentrations representing the neighborhood or larger spatial scales. PAMS sites collecting NO₂ data that are situated in an area of expected high NO₂ concentrations at the neighborhood or larger spatial scale may be used to satisfy this minimum monitoring requirement when the NO₂ monitor is operated year round. Emission inventories and meteorological analysis should be used to identify the appropriate locations within a CBSA for locating required area-wide NO₂ monitoring stations. CBSA populations shall be based on the latest available census figures.”

Pennsylvania contains three MSAs with populations greater than 1,000,000 - New York-Newark-Jersey City, NY-NJ-PA MSA, Philadelphia-Camden-Wilmington, PA-NJ-DE-MD MSA and Pittsburgh, PA MSA. Monitoring networks for these MSAs are operated and maintained by the New Jersey Department of Environmental Protection and New York Department of Environmental Conservation, Philadelphia County Air Management Services and the Allegheny County Health Department, respectively. No additional area-wide NO₂ monitoring is required in Pennsylvania under the minimum monitoring requirements set forth in Appendix D.

Regional Administrator-Required NO₂ Monitoring

Regional Administrator-required (RA-40) NO₂ monitoring requirements are set forth in 40 CFR Part 58, Appendix D as follows:

“4.3.4 Regional Administrator Required Monitoring

(a) The Regional Administrators, in collaboration with States, must require a minimum of forty additional NO₂ monitoring stations nationwide in any area, inside or outside of CBSAs, above the minimum monitoring requirements, with a primary focus on siting these monitors in locations to protect susceptible and vulnerable populations. The Regional Administrators, working with States, may also consider additional factors described in paragraph (b) below to require monitors beyond the minimum network requirement.”

U.S. EPA Region III, in consultation with DEP, has selected the Chester (Delaware County) and Erie (Erie County) NO₂ monitors operated by DEP to be designated as RA-40 monitors.

In addition to satisfying the three categories of minimum monitoring requirements described above, DEP maintains NO₂ monitoring sites for use in Air Quality Index (AQI) reporting and forecasting. Ambient NO₂ concentrations are used in ambient air modeling and forecasting as a surrogate for ozone formation and to characterize the strength of meteorological inversions.

Carbon Monoxide (CO) Network Design Requirements

Minimum CO monitoring requirements include requirements for near-road and EPA Regional Administrator Required monitoring.

Near-Road CO Monitoring

Near-road CO monitoring requirements are set forth in 40 CFR Part 58, Appendix D as follows:

“4.2.1 General Requirements. (a) Except as provided in subsection (b), one CO monitor is required to operate collocated with one required near-road NO₂ monitor, as required in Section 4.3.2 of this part, in CBSAs having a population of 1,000,000 or more persons. If a CBSA has more than one required near-road NO₂ monitor, only one CO monitor is required to be collocated with a near-road NO₂ monitor within that CBSA.”

The Commonwealth of Pennsylvania contains three MSAs, either wholly or in part, with populations greater than 1,000,000 persons – New York-Newark-Jersey City, NY-NJ-PA MSA, Philadelphia-Camden-Wilmington, PA-NJ-DE-MD MSA and Pittsburgh, PA MSA. Air quality monitoring for the New York-Newark-Jersey City MSA is performed by the New York State Department of Environmental Conservation and New Jersey Department of Environmental Protection. Air Quality Monitoring for the Philadelphia-Camden-Wilmington MSA is shared between the Delaware Department of Natural Resources and Environmental Control, Maryland Department of the Environment, New Jersey Department of Environmental Protection, Philadelphia Air Management Services (Philadelphia County, PA) and DEP (remaining PA portion). Air quality monitoring for the Pittsburgh MSA is shared between the Allegheny County Health Department (Allegheny County) and DEP. For the Pennsylvania portions of these three MSAs, the NO₂ near-road monitoring requirements, and thus the CO monitoring requirements, are being met by the two aforementioned Pennsylvania county agencies. As such, DEP is not required to maintain additional CO monitors outside the Philadelphia and Allegheny County networks, for NAAQS compliance purposes.

Regional Administrator-Required Monitoring

Regional Administrator-required CO monitoring requirements are set forth in 40 CFR Part 58, Appendix D as follows:

“4.2.2 Regional Administrator Required Monitoring. (a) The Regional Administrators, in collaboration with states, may require additional CO monitors above the minimum number of monitors required in 4.2.1 of this part, where the minimum monitoring requirements are not sufficient to meet monitoring objectives. The Regional Administrator may require, at his/her discretion, additional monitors in situations where data or other information suggest that CO concentrations may be approaching or exceeding the NAAQS. Such situations include, but are not limited to,

(1) characterizing impacts on ground-level concentrations due to stationary CO sources,
(2) characterizing CO concentrations in downtown areas or urban street canyons, and
(3) characterizing CO concentrations in areas that are subject to high ground level CO concentrations particularly due to or enhanced by topographical and meteorological impacts. The Regional Administrator and the responsible State or local air monitoring agency shall work together to design and maintain the most appropriate CO network to address the data needs for an area, and include all monitors under this provision in the annual monitoring network plan.”

As of the date of this document, the EPA Region III Administrator has not informed DEP that any of its monitors are needed to fulfill the RA-required CO monitoring requirement, nor requested DEP to establish a new CO monitoring site to fulfill this requirement.

Fine Particulate Matter (PM_{2.5}) Network Design Requirements

Minimum PM_{2.5} monitoring requirements are set forth in 40 CFR Part 58, Appendix D as follows:

“4.7.1 General Requirements. (a) State, and where applicable local, agencies must operate the minimum number of required PM_{2.5} SLAMS sites listed in Table D-5 of this appendix. The NCore sites are expected to complement the PM_{2.5} data collection that takes place at non-NCore SLAMS sites, and both types of sites can be used to meet the minimum PM_{2.5} network requirements. Deviations from these PM_{2.5} monitoring requirements must be approved by the EPA Regional Administrator.”

Table C-10. Minimum PM_{2.5} Monitoring Requirements

(Table D-5 of Appendix D to Part 58—PM_{2.5} Minimum Monitoring Requirements)

MSA population ^{1,2}	Most recent 3-year design value ≥85% of any PM _{2.5} NAAQS ³	Most recent 3-year design value <85% of any PM _{2.5} NAAQS ^{3 4}
>1,000,000	3	2
500,000-1,000,000	2	1
50,000-<500,000 ⁵	1	0

¹ Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

² Population based on latest available census figures.

³ The PM_{2.5} National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

⁴ These minimum monitoring requirements apply in the absence of a design value.

⁵ Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

These minimum PM_{2.5} monitoring requirements are satisfied as detailed in Table C-11. Ambient air monitoring sites operated by agencies other than DEP are included on the map, and listed in the “Other SLAMS Monitors” column of the table. Changes to the DEP PM_{2.5} monitoring network as described in this plan are included in the table. As shown, the number of PM_{2.5} monitoring sites within the twenty Pennsylvania MSAs meets or exceeds the minimum monitoring requirement. In addition, the total PM_{2.5} monitoring network encompasses a substantially greater number of monitoring sites than the minimum requirement.

Table C-11. PM_{2.5} Minimum Monitoring Requirements Demonstration, 2020-2021

MSA	2018 Population Estimate	2018 Max Annual Design Value	2018 Max 24-hr Design Value	No. of Monitors Required	No. of DEP SLAMS Monitors	Other SLAMS Monitors	Total No. of Monitors	Add'l Monitors Needed
Allentown-Bethlehem-Easton MSA	842,913	9.0	23	1	2	NJ-1	3	0
Altoona MSA	122,492	8.1	21	0	1		1	0
Bloomsburg-Berwick MSA	83,696	No monitors		0	0		0	0
Chambersburg-Waynesboro MSA	154,835	No monitors		0	0		0	0
East Stroudsburg MSA	169,507	No monitors		0	0		0	0
Erie MSA	272,061	8.1	19	0	1		1	0

MSA	2018 Population Estimate	2018 Max Annual Design Value	2018 Max 24-hr Design Value	No. of Monitors Required	No. of DEP SLAMS Monitors	Other SLAMS Monitors	Total No. of Monitors	Add'l Monitors Needed
Gettysburg MSA	102,811	7.6	19	0	1		1	0
Harrisburg-Carlisle MSA	574,659	8.6	24	1	2		2	0
Johnstown MSA	131,730	9.7	22	0	1		1	0
Lancaster MSA	543,557	9.8	25	1	2		2	0
Lebanon MSA	141,314	9.3	26	0	1		1	0
New York-Newark-Jersey City MSA	19,979,477	10	23	2	0	NJ-12; NY-11	23	0
Philadelphia-Camden- Wilmington MSA	6,096,372	10.7	24	3	4	AMS-5; DE-5; MD-1; NJ-3	18	0
Pittsburgh MSA	2,324,743	12.6	35	3	7	ACHD-9	16	0
Reading MSA	420,152	8.5	23	0	1		1	0
Scranton-Wilkes-Barre- Hazleton MSA	555,485	8.3	19	1	2		2	0
State College MSA	162,805	8.1	20	0	1		1	0
Williamsport MSA	113,664	Monitor start 2019		0	1		1	0
York-Hanover MSA	448,273	9.3	21	0	1		1	0
Youngstown-Warren- Boardman MSA	538,952	9.3	21	1	1	OH-2	3	0
Indiana, PA Micro Area	84,501	Pending Monitor		N/A	1		1	N/A
Sayre, PA Micro Area	60,833	7.0	17	N/A	1		1	N/A
Northcentral Non-MSA Region	N/A	7.7	17	N/A	1		1	N/A
Northeast Non-MSA Region	N/A	6.4	16	N/A	1		1	N/A
Southwest Non-MSA Region	N/A	6.2	14	N/A	1		1	N/A

A requirement for continuous PM_{2.5} monitoring is set forth in 40 CFR Part 58, Appendix D as follows:

“4.7.2 Requirement for Continuous PM_{2.5} Monitoring. The State, or where appropriate, local agencies must operate continuous PM_{2.5} analyzers equal to at least one-half (round up) the minimum required sites listed in Table D-5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies. State and local air monitoring agencies must use methodologies and quality assurance/quality control (QA/QC) procedures approved by the EPA Regional Administrator for these required continuous analyzers.”

DEP's planned air monitoring network for 2020-2021 includes 36 continuous PM_{2.5} monitors in total, either designated as primary monitors, or collocated with FRM primary monitors. Thirty-one of these monitors are located in MSAs. DEP operates all continuous PM_{2.5} monitors as SLAMS monitors.

Table C-12 demonstrates that DEP either meets or exceeds the continuous PM_{2.5} monitoring requirement.

Table C-12. PM_{2.5} Continuous Monitoring Requirements Demonstration, 2020-2021

MSA	No. of SLAMS Monitors Required	No. of Continuous Monitors Required	No. of DEP SLAMS Continuous Method Monitors	Other Continuous Method Monitors	Total No. of Continuous Method Monitors	Add'l Continuous Monitors Required
Allentown-Bethlehem-Easton MSA	1	1	2	NJ-1	3	0
Altoona MSA	0	0	1		1	0
Bloomsburg-Berwick MSA	0	0	0		0	0
Chambersburg-Waynesboro MSA	0	0	0		0	0
East Stroudsburg MSA	0	0	0		0	0
Erie MSA	0	0	1		1	0
Gettysburg MSA	0	0	1		1	0
Harrisburg-Carlisle MSA	1	1	2		2	0
Johnstown MSA	0	0	2		2	0
Lancaster MSA	1	1	2		2	0
Lebanon MSA	0	0	1		1	0
New York-Newark-Jersey City MSA	2	1	0	NJ-7; NY-2	9	0
Philadelphia-Camden-Wilmington MSA	3	2	4	AMS-5; DE-3; MD-1; NJ-1	14	0
Pittsburgh MSA	3	2	8	ACHD-3	11	0
Reading MSA	0	0	1		1	0
Scranton-Wilkes-Barre-Hazleton MSA	1	1	2		2	0
State College MSA	0	0	1		1	0
Williamsport MSA	0	0	1		1	0
York-Hanover MSA	0	0	1		1	0
Youngstown-Warren-Boardman MSA	1	1	1	OH-1	2	0

A requirement for PM_{2.5} regional background and transport monitoring is set forth in 40 CFR Part 58, Appendix D as follows:

“4.7.3 Requirement for PM_{2.5} Background and Transport Sites. Each State shall install and operate at least one PM_{2.5} site to monitor for regional background and at least one PM_{2.5} site to monitor regional transport. These monitoring sites may be at community-oriented sites and this requirement may be satisfied by a corresponding monitor in an area having similar air quality in another State. State and local air monitoring agencies must use methodologies and QA/QC procedures approved by the EPA

Regional Administrator for these sites. Methods used at these sites may include non-federal reference method samplers such as IMPROVE or continuous PM_{2.5} monitors.”

DEP maintains the Arendtsville, Florence, New Garden and Tioga County PM_{2.5} monitoring sites for purposes of regional background and transport monitoring. Table C-13 lists these sites along with their respective measurement scales and monitoring objectives.

Table C-13. PM_{2.5} Regional Background and Transport Requirements Demonstration

Site Name	AQS Code	County	Measurement Scale	Monitoring Objective	Monitoring Method(s)
Arendtsville	420010001	Adams	Regional Scale	General/Background	Teledyne 640
Florence	421255001	Washington	Regional Scale	General/Background	Teledyne 640
New Garden	420290100	Chester	Urban Scale	Regional Transport	Teledyne 640
Tioga County	421174000	Tioga	Urban Scale	Regional Transport	Teledyne 640

The Arendtsville and Florence monitoring sites are situated in rural settings and are classified as general/background monitors. The locations of these monitoring sites are such that PM_{2.5} impacts from any existing large SO₂, NO₂ and VOC sources would not be expected to influence the PM_{2.5} concentrations measured at these sites. Located in Washington County, PM_{2.5} concentrations measured at the Florence monitoring site are used to assess the background PM_{2.5} concentrations for western Pennsylvania regions. PM_{2.5} background concentrations in western Pennsylvania are representative of air flow patterns primarily originating in Ohio and West Virginia. Similarly, the Arendtsville monitoring site located in Adams County is used to assess background concentrations in eastern Pennsylvania, representing air flow patterns from western PA, western Maryland and West Virginia.

The regional transport sites – New Garden and Tioga County – are also situated in more rural areas of PA but tend to capture regional transport of pollution. New Garden captures the emissions from the Baltimore-Washington I-95 corridor, while Tioga County captures regional transport of emissions across the northern tier of Pennsylvania.

Particulate Matter (PM₁₀) Network Design Requirements

Minimum PM₁₀ monitoring requirements are set forth in 40 CFR Part 58, Appendix D as follows:

“4.6 Particulate Matter (PM₁₀) Design Criteria. (a) Table D-4 indicates the approximate number of permanent stations required in MSAs to characterize national and regional PM₁₀ air quality trends and geographical patterns. The number of PM₁₀ stations in areas where MSA populations exceed 1,000,000 must be in the range from 2 to 10 stations, while in low population urban areas, no more than two stations are required. A range of monitoring stations is specified in Table D-4 because sources of pollutants and local control efforts can vary from one part of the country to another and therefore, some flexibility is allowed in selecting the actual number of stations in any one locale. Modifications from these PM₁₀ monitoring requirements must be approved by the Regional Administrator.”